1

Rat Bite Fever Resembling Rheumatoid Arthritis in a 46 Year Old Female

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A 46 year old female was admitted with a 1 week history of fever and symmetrical inflammatory polyarthritis associated with morning stiffness of 30 minutes duration. Past medical history was significant for seizure disorder, irritable bowel syndrome, chronic back pain and iron deficiency anemia. Family history was unremarkable for any rheumatological disease. On examination, she was febrile (38 degree celsius) with synovitis of her wrists, ankles, bilateral 5th metatarsophalangeal joints and left 3rd metacarpophalangeal joint. ESR and CRP were found to be elevated (76 MM/HR and 149 mg/L). Initial blood culture and serological tests including hepatitis B and C, parvovirus B19, HIV, Lyme disease and Neisseria gonorrhea were negative. Rheumatological work up including rheumatoid factor, anti-nuclear antibody, anti-cyclic citrullinated peptide antibody, anti-neutrophil cytoplasmic antibodies, anti-dsDNA antibody and compliment levels were all within normal limits. The patient was treated with a presumed diagnosis of rheumatoid arthritis with oral prednisone with mild improvement in synovitis. She was discharged home on triple therapy (methotrexate, sulphasalazine and hydroxychloroquine). The patient then returned to the hospital next day with worsening synovitis, fever 39 degree celcius and significant worsening of lower back pain. Sulphasalazine and methotrexate were discontinued due to mild elevation of liver enzymes. She continued to be febrile intermittently with ongoing elevated ESR of 124 MM/HR and CRP of 170 mg/L. Synovial fluid culture of the left ankle was negative. She then received intravenous methylprednisone for 2 days for ongoing severe pain with no improvement. Repeat blood culture grew Streptobacillus moniliformis. MRI revealed L5-S1 diskiitis .On further questioning, patient admitted to having a pet rat and a pet cat, both of which had died of an unknown illness in the week prior to the initial presentation to hospital. She also reported receiving a rat scratch to her chest.

A diagnosis of Rat Bite fever (RBF) was made. The patient then was treated with intravenous ceftazidime with discontinuation of steroids and hydroxycholoquine. Synovitis improved significantly.

Conclusion: Rat bite fever is very uncommon and very difficult to diagnose. A history of zoonotic exposure is the key to diagnosis. Prognosis is good when treated appropriately but potentially lethal if left untreated. It is important for rheumatologists to be aware of RBF as a cause of symmetrical inflammatory polyarthritis and mimic of rheumatoid arthritis. This case highlights the potential hazard of misdiagnosis and treatment with immunosuppressive agents.

2

RheumExam Atlas: A Web-Based Photographic Atlas to Support Physical Exam Teaching

Sonia Seto (University of Toronto, Toronto); Lori Albert (University of Toronto, Toronto)

Objectives: The diagnosis of rheumatic diseases often rests heavily on the physical examination. Therapeutic advances in the last decade have made it more challenging to find individuals with early disease manifestations or persistent physical findings to participate in clinical instruction of trainees. Many pictures are available on an internet search, but in the absence of support by an experienced clinician, these pictures may be misinterpreted by learners and lead to chronic misconceptions. In 2008 a bedside teaching atlas was developed to support learner recognition of physical findings in rheumatology during clinical teaching. (Albert LJ, Mills K and Roper N. Creation of a Bedside Teaching Atlas. Poster presented at: CRA-ASM

2009). This included pictures of real patients' physical findings (eg.PIP joint effusions, sclerodactyly, etc.) and explanatory text for self-study or use by non-rheumatologist teachers. The atlas has been a very successful teaching tool locally. Limitations of the atlas, however, include its lack of availability, its size and bulk (making it difficult to compare and contrast pictures such as PIP effusions vs Bouchard's nodes) and the inability to add new pictures. Development of an electronic atlas was undertaken to overcome these limitations.
Methods: A student enrolled in the MSc program in Biomedical Communications at University of Toronto (SS) was engaged through the Office of Integrated Medical Education summer Educational Information Technology program to build a tablet-responsive app to replace the hardcopy atlas. A web-based application was used that is compatible with Android or iOS, and can be used on a standard desktop computer if tablet or Wifi are unavailable. Functionality relevant to a clinical teaching session was built into the design: user-friendly index; capacity to move easily through the picture bank and toggle easily between pictures; concealable text for self-study; functionality for videos (e.g. Bulge sign for knee effusions); capacity to add new pictures; an imbedded evaluation/rating template.
Results: RheumExam Atlas (rheumexamatlas.com) is now widely available at no cost. It will be of value for clinical teachers and trainees. It can be used by all health professions and all specialities, in urban or remote communities, with or without a rheumatologist teacher.
Conclusion: A web-based atlas is readily accessible and provides a resource to support learning and recognition of a broad range of key physical findings in the rheumatic diseases. It is hoped that rheumatologists across Canada will submit photographs and other relevant content for uploading to RheumExam Atlas to enhance and further build this teaching resource.

3

Use of Antibiotics and Subsequent Risk of Systemic Lupus Erythematous: A Matched Case-Control Study

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Objectives: Objective: To examine the association of exposure to cyclines, macrolides, and penicillins antibiotics with the development of subsequent Systemic Lupus Erythematosus (SLE).
Methods: Methods: We conducted a nested case-control study using an administrative health database in British Columbia, Canada, from 1997-2010. Cases were defined using a validated algorithm that includes a combination of ICD-9 and ICD-10 codes and SLE drug therapy. Incident cases were age-, sex-, and entry time-matched to 10 controls using density-based sampling. We evaluated cumulative exposure to any cyclines, macrolides, and penicillins prior to SLE diagnosis allowing for removal of cases with any exposure in the year prior to the index date. Adjusted odds ratios were computed using conditional logistic regression.
Results: Results: We identified 3,639 new SLE cases corresponding to 361,032 matched controls. All three classes of antibiotics had a statistically significant association with the development of SLE in the unadjusted models (Table 1). However, after adjusting for the Charlson comorbidity index, hormone use, healthcare resource use and socioeconomic status only females exposed to cyclines showed a statistically significant association [OR = 1.6 (95% CI, 1.3–1.9)].
Conclusion: Conclusion: Females exposed to cyclin antibiotics had a 60% increased risk of

developing SLE.

4

What is the Location of Dactylitis in Ankylosing Spondylitis and Psoriatic Arthritis Patients and how do they Respond to Anti-TNF Treatment?

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Objectives: Dactylitis is one of the most commonly reported features in spondyloarthritis. It has been hypothesized that dactylitis is a functional enthesitis at the proximal interphalangeal joints, resulting in synovitis, tenosynovitis, bone and soft tissue oedema to the digit, and may simultaneously involve multiple digits. Our objective was to identify the location of dactylitis in ankylosing spondylitis (AS) and psoriatic arthritis (PsA) patients and to determine their response to anti-TNF treatment.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis (RA), AS, or PsA with infliximab (IFX) or golimumab (GLM). Eligible people for this analysis included AS and PsA patients treated with IFX who were enrolled since 2005 or with GLM since 2010 who had available information on dactylitis. The McNemar (paired Chi-square) test was used to compare the presence of dactylitis over time.

Results: A total of 260 AS and 261 PsA patients were enrolled with a mean (SD) age at baseline of 46.1 (13.0) vs. 50.0 (12.0) years, disease duration of 6.4 (9.8) vs. 5.2 (6.8) years, and proportion of females 40.6% vs. 48.5%, respectively. Among patients with AS, dactylitis was reported in 6.2% and 2.2% of patients at baseline and 6 months, respectively; at 6 months of treatment 73.3% of AS patients with dactylitis at baseline had no dactylitis and 1.6% developed dactylitis (P=0.057). For PsA higher proportions of dactylitis were observed with 30.7%, and 12.7%, respectively; at 6 months of treatment 69.0% of PsA patients with dactylitis at baseline had no dactylitis and 4.6% developed dactylitis (P<0.001). The highest prevalence of dactylitis observed was for feet in AS and PsA patients. Among AS patients, the baseline distribution of dactylitis amongst hand digits (HD) and foot digits (FD) included HD1(1.9%), HD2(3.1%), HD3(3.1%), HD4(1.5%), HD5(1.5%), FD1(2.7%), FD2(3.8%), FD3(2.3%), FD4(2.3%), FD5(1.5%). Among PsA patients, baseline dactylitis included HD1(4.2%), HD2(9.2%), HD3(8.0%), HD4(8.0%), HD5(5.4%), FD1(8.0%), FD2(12.6%), FD3(11.1%), FD4(14.9%), FD5(10.0%). Presence of dactylitis in hands or feet (any digit) was associated with significantly higher HAQ in AS and PsA (AS: ΔHAQ=1.36 ($P\leq0.001$); PsA: ΔHAQ=0. ($P\leq0.001$)).

Conclusion: A considerable proportion of PsA patients had dactylitis at anti-TNF initiation in this Canadian real-world cohort. Although a lower proportion of patients had dactylitis among AS patients, the presence of dactylitis was associated with higher functional disability in both AS and PsA patients. Treatment with IFX or GLM for 6 months was associated with significant reduction in the prevalence of dactylitis.

5

What is the Variability of HAQ over Time in Patients with Rheumatoid Arthritis Treated

with Anti-TNF?

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Objectives: The Health Assessment Questionnaire (HAQ) remains the gold standard for measuring patient-reported functional status in rheumatoid arthritis (RA) and is included among the measures suggested by the American College of Rheumatology for making treatment decisions in routine care. We have previously shown that significant variability exists in the correlation of individual HAQ questions with patient-reported and clinical outcomes. The aim of this analysis was to assess, in routine care, the timelines of HAQ improvement as compared to clinical improvement and to examine possible differences in the improvement of individual questions.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, AS, or PsA with infliximab (IFX) or golimumab (GLM). Eligible people for this analysis included RA patients treated with IFX who were enrolled since 2002 or with GLM since 2010. Time to achieving minimal important difference (MID; $\Delta \geq 0.22$) in HAQ, HAQ$\leq$1, minimal disease (MD) in individual HAQ questions (no or some difficulty), CDAI low disease activity (LDA), or CDAI remission was assessed with the Kaplan-Maier estimator of the survival function and cox regression.

Results: 1205 patients (75.3% female) were included with mean (SD) age of 56.0 (13.6) years and disease duration of 8.4 (8.9) years at baseline. Mean (SD) HAQ and CDAI were 1.55 (0.72) and 33.8 (17.4), respectively. Statistically significant and clinically meaningful improvements in both HAQ and CDAI were observed over time. The cumulative probability of achieving HAQ MID, HAQ$\leq$1, CDAI LDA, and CDAI remission by 12 months was 69.5%, 54.5%, 54.1%, and 18.1%, respectively. Time to achieving HAQ MID [Hazard Ratio (95% CI): 3.6 (3.2-4.2)], HAQ$\leq$1 [2.9 (2.6-3.4)], and CDAI LDA [3.1 (2.7-3.6)] was significantly lower as compared to CDAI remission. With respect to individual HAQ questions, at baseline, the most predominant usual activities that patients were unable to do were taking a tub bath (27.9%), reaching and getting down a 5-pound object from the head (21.8%), and doing chores such as vacuuming or yard work (23.2%). In accordance, time to having no or some difficulty in these activities was significantly higher compared to the remaining HAQ items.

Conclusion: The results show that the timelines for achieving HAQ targets in routine care is comparable to that of achieving CDAI LDA. Significant differences were observed in terms of improvement in individual HAQ items with the inability to take a tub bath, getting heavy overhead objects down, and doing chores being the most persistent.

6

Improving the Ordering of Hand and Wrist Ultrasound to Manage Inflammatory Arthritis

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Objectives: Musculoskeletal ultrasound (US) is a reliable and sensitive tool increasingly used to assess for subclinical synovitis in the diagnosis and management of rheumatologic disease. There is little literature exploring how often active joint inflammation is detected via US and which clinical characteristics are associated with US-detected synovitis. This study aims to inform effective US ordering practices in the management of inflammatory arthritis by determining the clinical and laboratory correlates of positive US results.
Methods: A retrospective chart review was conducted for hand/wrist ultrasounds ordered in an academic outpatient rheumatology clinic between May 1 2014 and April 30 2015. Data extracted included indication for US, and evidence of joint effusion, synovial thickening, or Doppler flow by radiologist report. Clinical data obtained included age, gender, treatment, the presence and duration of a.m. stiffness, swelling, or pain on history, and joint tenderness or swelling on exam. Laboratory parameters (ESR, CRP, ANA, RF, and anti-CCP), and whether or not clinical management changed post-US were also collected. Ultrasounds were characterized as positive if they showed evidence of synovial thickening and/or active Doppler flow. Univariate statistical analysis was conducted using the Wilcoxon Mann-Whitney test and Fisher's exact test, and multivariate analysis was conducted using a logistic regression model.
Results: Over the study period 72 ultrasounds were ordered, of which 27 (37%) were positive and 45 (63%) were negative. 51 (71%) ultrasounds were ordered for diagnosis, and 21 (29%) for disease management. The median patient age was 56 and 57 (79%) patients were women. Treatment at the time of US was as follows: 23 (32%) patients were on NSAIDs, 17 (24%) were on DMARDs, 6 (8%) were on systemic steroids and 19 (26%) had no treatment. Predictors of positive US in the univariate analysis were disease control as the indication for US ($p=0.035$), positive ANA ($p=0.002$), and treatment with biologic/DMARD ($p=0.048$). Only positive ANA was predictive in a multivariate model ($p=0.004$). Positive ultrasounds were more likely to result in a change in clinical management ($p=0.005$).
Conclusion: This study did not demonstrate any clinical factors associated with positive hand/wrist US, and the majority of ultrasounds were negative, highlighting the importance of clinical assessment. This study is limited by small sample size. Further studies are needed to determine whether any clinical features can guide the ordering of ultrasounds, limiting US use to situations where it is more likely to change or inform disease management.

7

Development, Sensibility and Validity of a Systemic Autoimmune Rheumatic Disease Case Ascertainment Tool

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Objectives: Case ascertainment in a population through self-report is a convenient way to collect information, but is often inaccurate. The purpose of this study was to develop, assess the sensibility and validate a tool to identify cases of systemic autoimmune rheumatic diseases (SARD) in the outpatient setting.
Methods: The SARD tool was administered to cases and controls consecutively sampled from specialty clinics. Determinants of sensibility: comprehensibility, feasibility, face validity, and

acceptability were evaluated using a numeric rating scale from 1–7. Comprehensibility was evaluated using the Flesch Reading Ease and Flesch-Kincaid Grade Level. Medical records were used to validate the self-reported diagnoses using Cohen's kappa statistic (κ).
Results: 141 participants (systemic lupus erythematosus (SLE), systemic sclerosis (SSc), rheumatoid arthritis, Sjögren's disease (SjD), inflammatory myositis (PM/DM) and controls) completed the questionnaire. The Flesch Reading Ease score was 77.1 and the Flesch-Kincaid Grade level was 4.4. Respondents endorsed (mean rating ± standard deviation) comprehensibility (6.12±0.92), feasibility (5.94±0.81), face validity (5.35±1.10) and acceptability (3.10±2.03, where 1 = very unlikely). The SARD tool had a sensitivity of 0.91 (95% CI 0.88, 0.94) and a specificity of 0.99 (0.96, 1.00). For the whole cohort, the agreement between the SARD tool and medical record was κ= 0.82 (95% CI 0.77, 0.88). Subgroup analysis by SARD found kappa coefficients for SLE κ = 0.88 (95% CI 0.79, 0.97), SSc κ = 1.0 (95% CI 0.97, 1.0), PM/DM κ =0.72 (95% CI 0.49, 0.95), SjD κ = 0.85 (95% CI 0.71, 0.99) and rheumatoid arthritis κ = 0. 61 (95% CI 0.34, 0.87) with the confirmatory question. The screening questions had sensitivity ranging 0.96–1.0, and specificity ranging 0.88–1.
Conclusion: This SARD case ascertainment tool has demonstrable sensibility and validity. The use of both screening and confirmatory questions confers added accuracy.

8

Safety and Effectiveness of Hyperbaric Oxygen Therapy for Systemic Sclerosis Ulcers

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Objectives: Vascular complications of systemic sclerosis (SSc, scleroderma) can result in ulcers in the distal extremities, which limit function and are often refractory to conventional treatments. Hyperbaric oxygen therapy (HBOT) has been used in the treatment of non-healing wounds, but its utility in patients with SSc is uncertain. The primary objective of this study was to evaluate the safety of HBOT for SSc ulcers. We secondarily evaluated the effectiveness of HBOT for SSc ulcers, and patient selection criteria for treatment of SSc ulcer patients with HBOT.
Methods: We conducted a retrospective cohort study of SSc patients who were evaluated for treatment with HBOT in the Toronto Scleroderma Program and the Toronto General Hospital Hyperbaric Unit between 2002 and 2015. HBOT treatments involved 30-50 sessions in a monoplace or multiplace chamber with compression to a maximum depth of 2.5 atm and breathing oxygen for a total of 90 minutes 5 days per week. Ulcers were defined as lesions with a visually discernable depth and loss of epithelial continuity. Reasons for declining access to HBOT, adverse events and effectiveness in ulcer healing were evaluated. An ulcer was categorized as healed if it achieved epithelial continuity or National Pressure Ulcer Advisory Panel (NPUAP) stage X (stable necrotic tissue core or eschar). Transcutaneous oxygen tension criteria for evaluating 'healability' in diabetic foot ulcers were applied as none have been validated for SSc.
Results: 2261 charts were reviewed to identify 24 HBOT treated ulcers in 8 SSc subjects. They had a mean ± SD age of 58.9 ± 15.4 years and disease duration of 13.8 ± 8.9 years. Seventy-five percent were female. Twelve SSc subjects did not receive HBOT due to reasons that included lack of achieving "healable" response to oxygen on transcutaneous oximetry and technical limitations in sensor placement options (n=4), presence of moderate - severe pulmonary arterial

hypertension (n=2) and confinement anxiety (n=1). Of the HBOT treated subjects, adverse events included brief episodes of otic barotrauma (37.5%). Fifteen ulcers (62.5%) achieved epithelial continuity or NPUAP stage X after HBOT.
Conclusion: HBOT may be an effective option for SSc patients with non-healing ulcers. Therapy was generally well-tolerated, with no significant adverse events although transient self-limiting otic barotrauma was reported. Patient selection criteria specific to the SSc population may need to be developed.

9

Concomitant Treatment Use during Treatment with Golimumab in Patients with Rheumatoid Arthritis.

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Objectives: Previous studies have shown that, when sustained good clinical response has been achieved with a biologic therapy, traditional disease-modifying anti-rheumatic drugs (DMARDs) and other treatments can be reduced or discontinued. The aim of this analysis was to assess the discontinuation of concomitant treatment and DMARD tapering in rheumatoid arthritis (RA) patients treated with golimumab (GLM) in Canadian routine clinical practice.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, ankylosing spondylitis, psoriatic arthritis with infliximab or GLM as first biologics or after having been treated with a biologic for <6 months. Patients with RA treated with GLM who were enrolled between 2010 and 2014 were included in this analysis. DMARD, steroid and NSAID discontinuation were defined as no use of any drugs in these categories. Time to treatment discontinuation or tapering was assessed both with descriptive statistics and the Kaplan Meier estimator of the survival function.
Results: 273 RA patients treated with GLM (mean dose = 50 mg s.c. monthly) were included in the analysis; 72.2% were female, mean (SD) age was 57.4 (13.5) years and disease duration was 8.1 (8.6) years. Mean (SD) disease parameters at baseline were: DAS28 = 5.1 (1.7), CDAI = 27.8 (15.9), SJC28 = 7.9 (5.9), TJC28 = 8.9 (7.0), HAQ-DI = 1.3 (0.7), MDGA (0-10 NRS) = 5.5 (2.2), PtGA (mm VAS) = 54.6 (27.9). At baseline, 74.7% were taking concomitant DMARDs, 30.8% were on NSAIDS, and 21.2% on corticosteroid. Mean (SD) available follow-up was 13.8 (9.4) months. Upon treatment with GLM, 11.8% of the patients on a DMARD at baseline discontinued DMARD treatment after a mean (SD) of 15.3 (10.0) months. Furthermore, 56.9% and 86.7% of patients completely discontinued steroid and NSAID treatment after a mean (SD) follow-up of 8.9 (5.4) months and 6.2 (1.3) months, respectively. DMARD dose tapering was documented for 32.4% of patients on DMARDs after a mean (SD) follow-up of 11.2 (8.9) months.
Conclusion: The results of this Canadian longitudinal observational study have shown that treatment with GLM was associated with discontinuation of concomitant DMARD, steroid, and NSAID treatment as well as DMARD tapering in RA patients. The long-term benefits of this practice for patients have to be determined.

10

Smoking Cessation Measures in Rheumatology Practices: Results from a Self- Reflective Chart Audit

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Objectives: Smoking is associated with greater disease activity in Rheumatoid Arthritis1, radiographic progression 2, poorer functional status3 and decreased response to therapy4. The primary objective of this analysis is to look at the change in smoking cessation practices following an educational intervention focused on the implications of smoking in rheumatology patients.

Methods: 50 Rheumatologists will complete a retrospective chart audit on 20 Rheumatoid Arthritis (RA) patients. Physicians will participate in a smoking cessation educative program or review smoking cessation guidelines. A total of 1000 patients will be analyzed. Participating physicians will complete an initial demographic questionnaire followed by a pre-educational intervention survey with a specific focus on a chart review of 10 RA patients who are current smokers. 35-60 days after the educational program, physicians will complete a chart review of 10 different patients who are current smokers. We will analyze the pre-and post-surveys for any changes in practice. We will also look at the proportion of patients with a smoking history (current/former/never/unknown) recorded in their charts, and the proportion of smokers who receive information from the clinician on the effects and impact of smoking on RA and smoking cessation.

Results: We will share the results from the smoking chart audit which will be completed in time for presentation at CRA 2016 Annual Scientific Meeting.

Conclusion: Smoking has negative impacts on disease severity, patient outcomes, radiographic progression and biologic retention in Rheumatology patients. We will share the results of a self-reflective chart audit that assesses clinician behaviours pre- and post-educational intervention, and the implications these might have for rheumatology practice. References: 1. Sokolove J, et al. Smoking status is associated with inflammatory cytokine profile and disease activity: decreased inflammation and disease improvement with smoking cessation? Arthritis Rheum 2014;66:S146. 2. Saevarsdottir S, et al. Current smoking status is a strong predictor of radiographic progression in early rheumatoid arthritis: results from the SWEFOT trial. Ann Rheum Dis 2014 April 4; Epub ahead of print. 3. Fisher MC, et al. Smoking, smoking cessation, and disease activity in a large cohort of patients with rheumatoid arthritis. J Rheumatol 2012;39:904-9. 4. Söderlin MK, et al. Smoking at onset of rheumatoid arthritis (RA) and its effect on disease activity and functional status: experiences from BARFOT, a long-term observational study on early RA. Scand J Rheumatol 2011;40:249-55.

11

Do Canadian Rheumatologists Actually Treat to Target Once a Biologic has been Initiated? An Analysis from a Prospective, Observational Registry

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Objectives: The objective of this analysis was to assess the frequency and type of treatment optimization in cases where treatment target was not achieved in RA patients initiating treatment with infliximab or golimumab in Canadian routine clinical care.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, ankylosing spondylitis, or psoriatic arthritis with infliximab, golimumab or ustekinumab. RA patients enrolled during 2002-2014 and with available CDAI information at both months 6 and 12 were included. DA was defined according to the CDAI criteria (remission: ≤2.8; low: >2.8 to ≤10; moderate: >10 to ≤22; high: >22). The association between treatment changes and target achievement was assessed with the Chi-square test.
Results: A total of 498 patients were included, with a mean (SD) age and disease duration of 56.4 (13.2) and 8.6 (8.6) years, respectively. The majority of patients were female (74.1%) and treated with infliximab (74.5%). After 6 months of treatment, 46% of patients had achieved treatment target of remission or low DA, and 54% were still at moderate/high DA. Among the latter, treatment was adjusted in 36.4% and was significantly associated with target achievement at month 12 (46.9% vs. 31%; P=0.009). The frequency of treatment changes by type were: DMARD switch/add-on (11.9% of patients), biologic up-titration (10%), DMARD up-titration (8.2%), steroid initiation (7.8%), NSAID initiation (5.6%), and DMARD initiation (3%). Among patients at moderate/high DA at both visits for whom no treatment adjustment was made, mean (SD) disease parameters at 6 months were: SJC28 = 5.7 (5.0); TJC28 = 8.6 (6.5); MDGA = 3.8 (2.0); PtGA = 4.5 (2.4). Among patients with treatment adjustment: SJC28 = 5.8 (4.2); TJC28 = 9.4 (7.0); MDGA = 4.7 (2.3); PtGA = 5.8 (2.1). Among patients at moderate/high DA at 6 months who achieved target at month 12 without treatment adjustment, disease parameters at month 6 were: SJC28 = 4.7 (4.5); TJC28 = 5.5 (5.1); MDGA = 3.2 (1.7); PtGA = 4.3 (2.5). Among those with a treatment adjustment: SJC28 = 3.5 (3.0); TJC28 = 5.1 (3.3); MDGA = 4.2 (2.2); PtGA = 4.7 (2.8).
Conclusion: These results suggest that a considerable portion of patients on biologics are not treated to a CRA recommended target in Canada. Treatment adjustment was found to be mainly associated with the physician's global assessment. PtGA and TJC28 were also significantly higher in those receiving treatment adjustments, while SJC did not correlate with treatment adjustments.

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The Quality and Continuity of Information between Primary Care Physicians and Rheumatologists

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Objectives: Good communication is essential to a safe and high-quality referral and consultation process, by providing quality continuity of care, reducing delays in diagnostic processes and repetition of tests, and improving patient and provider satisfaction. Our aim was to evaluate the quality of referral information from family physicians to rheumatologists and the quality and

timeliness of consultation information from rheumatologists back to primary care.
Methods: We performed a retrospective chart abstraction study among patients with rheumatology referrals within the primary care Electronic Medical Record Administrative data Linked Database (EMRALD). Using a standardized data abstraction tool, we assessed the completeness and timeliness of referral and consultation letters. Descriptive analyses were performed overall and stratified by diagnoses provided by the rheumatologists.
Results: We identified 2430 referrals from 168 family doctors and 2015 (83%) patients were seen by 146 rheumatologists. Most referrals (2417;99.5%) occurred between 2005-2013. Overall, the family physician stressed an urgent consultation among 211 patients (9%); more frequently among RA and vasculitis patients (21%). Most referral letters (68%) provided details of diagnostic tests (75% labs, 50% imaging, 1% biopsy). Laboratory tests were most frequently provided for systemic inflammatory conditions (89%), with imaging most frequently provided for patients with mechanical/degenerative arthritis (50%). Almost all referral letters (92%) contained details of patient symptoms, with 54% and 21% of patients having documentation of tender and swollen joints, respectively. Only 43% of patients with systemic inflammatory conditions had documentation of symptom duration. For RA patients, 51% had swollen joints according to the referral letter, with 47% having no mention of swollen joints being absent or present. Overall, 69% of consultation letters were returned to primary care within 30 days (target: 100%); 83% within one year. The median (IQR) time to receipt of the consultation letter by family physicians was 19 (2-21) days. Among all 1899 patients with rheumatology consultation letters received post-referral, the rheumatologist initiated treatment among 37% patients within the first year (39% steroid injection, 14% oral steroid, 31% DMARD, 2% biologic). Overall, 93% of consultation letters provided a diagnosis/clinical impression, 92% provided a follow-up plan, 84% specified who was responsible for follow-up, 52% detailed instructions provided to the patient, and 17% mentioned allied health care providers involved in the patient's care.
Conclusion: Information relayed between family physicians and rheumatologists regarding patient medical histories was reasonably complete, although improvements are needed in the reporting of key triage information for referral letters, and timeliness of receipt of consultation letters. Supported by a CIORA grant.

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Characterizing Referrals to Rheumatologists to Better Understand Care Management of Patients with Rheumatic Diseases

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Objectives: Primary care physicians play a central role in the early detection and referral for patients with rheumatic diseases. Our aim was to characterize referrals to rheumatologists and investigate diagnostic and treatment patterns prior to after rheumatologist consultation.
Methods: We performed a retrospective chart review and an analysis of structured and semi-

structured data within the primary care Electronic Medical Record Administrative data Linked Database (EMRALD), representing comprehensive EMR data from 168 family physicians across Ontario, Canada. We identified patients with first-time rheumatology referrals. Referrals were characterized in terms of patient demographics, provisional diagnoses/clinical impressions, diagnostic tests and treatment, and other specialists seen for the complaint prior to rheumatology consultation.

Results: Among 2430 patients referred to rheumatologists, 69% were female and the mean (SD) age at time of referral was 53 (16) years. Overall, 2417 (99.5%) referrals occurred between 2005 and 2013. Reasons for referrals included: mechanical/degenerative arthritis (787; 32%), systemic inflammatory rheumatic diseases (745; 31%), regional musculoskeletal conditions (395; 16%), chronic pain conditions (346; 14%), osteoporosis (45; 2%), and other (e.g., abnormal labs, 112; 5%). Systemic inflammatory rheumatic disease referrals included inflammatory arthritis (287; 38%), connective tissue diseases and other systemic autoimmune rheumatic diseases (e.g., lupus, scleroderma, Sjogren's, Raynaud's) (131; 18%), gout/crystal arthropathies (122; 16%), spondyloarthropathies (120; 16%), polymyalgia rheumatica (66; 9%), and vasculitis (19; 3%). Among systemic inflammatory rheumatic disease patients, time from presentation in primary care to referral exceeded 100 days, except for patients with vasculitis. During this time, 61% of systemic inflammatory rheumatic disease patients received treatment by their family doctor (48% received NSAIDs/COXIBs, and 20% received corticosteroids). For rheumatoid arthritis patients, 72% received treatment (53% received NSAIDs/COXIBs, 27% received corticosteroids, and 6% received DMARDs) prior to rheumatologist consultation; 65% of RA patients were prescribed DMARDs within 4 weeks of the first rheumatology consultation. 33% of systemic inflammatory patients were also seen by another specialist (orthopedic surgeon, internist, allied health professional) for their complaint prior to seeing a rheumatologist.

Conclusion: We present novel data on the care management of patients with rheumatic diseases from primary care management up until rheumatology consultation. Approximately one in three referrals to rheumatologists were for a systemic inflammatory rheumatic disease. Understanding the referral patterns of family physicians can identify opportunities to improve care management of patients prior to rheumatology referral. Supported by a CIORA grant.

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Contributions of Social Determinants of Health on Remission in Rheumatoid Arthritis Patients

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Objectives: Treatment responses vary among rheumatoid arthritis (RA) patients. There is limited evidence on the contribution of social determinants of health (SDH) to treatment responses and disease outcomes in RA. This study aimed to determine the contribution of social determinants of health (SDH) to remission in RA.

Methods: Data were collected from the Ontario Best-practices Research Initiative (OBRI) Rheumatoid Arthritis Registry, a clinical registry of early and established adult RA patients followed in routine care. Treatment response at 6 and 12 months was assessed by the 2011 ACR/EULAR Simple Disease Activity Index (SDAI) and Clinical Disease Activity Index (CDAI) remission criteria. The SDH assessed include patient demographics, socioeconomic status, health behaviors, living condition, marital status, and depression. Variables with a $p<0.2$

in univariate analyses were included for multivariable regression. The association between SDH and remission was evaluated by logistic regression, controlling for baseline clinical RA confounders such as RA duration and baseline RA medications, presence of X-ray erosion, antibody status, extra articular features, baseline disease activities, and functional disability. All statistical analyses were performed in SAS9.4.

Results: Among 2209 patients with baseline CDAI, 1832 and 1583 reached the 6- and 12-month follow-up, respectively. Among 1778 patients with baseline SDAI, 1505 and 1286 reached the 6- and 12-month follow-up. At 6 months, 14.8% and 15.5% of the patients achieved CDAI and SDAI remission, respectively. At 12 months, 18.9% and 19.8% of the patients achieved CDAI and SDAI remission. After adjusting for clinical confounders, higher neighborhood income was associated with 6-month CDAI remission (OR 1.04 per $10,000; 95%CI 1.00-1.07), while having private insurance was associated with 6-month SDAI remission (OR 0.63 95%CI 0.40-0.99 for non-insurer). At 12 months, smoking and not living alone were both associated with CDAI and SDAI remission (CDAI: OR 0.65 95%CI 0.44-0.96 for non-smoker, OR 3.02 95%CI 1.27-7.15 for not living alone; SDAI: OR 0.62 95%CI 0.40-0.96 for non-smoker, OR 2.87 95%CI 1.11-7.40 for not living alone). Living in a rural community was also associated with SDAI remission at 12 months (OR 1.79 95%CI 1.12-2.86).

Conclusion: Socioeconomic factors appear to have an effect on remission at 6 months. Health behavior and living environment appear to be associated with remission at 12 months. Different SDH may affect treatment response and disease outcome at different time points and this study highlights the complexity in studying SDH.

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Predictors of Disease Relapse and Recapture of Remission Following Relapse in an Ontario Rheumatoid Arthritis Population

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Objectives: The timing and severity of relapse and likelihood of "recapturing" remission following a relapse in RA is not well known. We aimed to describe time-to-relapse, factors associated with relapse and subsequent remission after relapse.

Methods: We performed a longitudinal analysis of patients enrolled in the Ontario Best Practices Research Initiative (OBRI), a clinical registry of RA patients in routine care. First clinical remission according to DAS28-ESR <2.6 following cohort entry was determined. Patients achieving remission with ≥ 1 follow-up visit were observed for average time until relapse (DAS28 >2.6). Disease activity at relapse as well as the prevalence and timing of subsequent remission was examined. Cox proportional hazards models calculated the hazard of remission and relapse adjusted for baseline variables and time-varying disease activity and medication changes.

Results: Results: The total cohort (N=2591) was 78% female with mean age 57 (13) years. Remission was achieved in 1258 patients (60%) with median time-to-first-remission of 314 days (IQR 153,552). Early RA was the only positive predictor of remission (Table). Among the remission group, 1117 had follow-up and 776 (69%) went on to experience a relapse. Median time-to-relapse was 204 days (IQR 129-390) and the majority switched from a state of remission to mild or moderate disease activity, in contrast to moderate or severe levels of disease activity

they experienced at baseline. Variables associated with relapse included female sex, higher DAS28 preceding relapse and use of biologic DMARD (bioDMARD) monotherapy and/or corticosteroids in the interval between remission and relapse; combination conventional synthetic DMARD (csDMARD) appeared to protect against the risk of relapse (Table). 452 (58%) patients regained remission after spending a median of 209 days (IQR 126-386) in a state of relapse. Similar variables associated with first remission, including disease duration and receipt of combination csDMARD or bioDMARD after relapse, were negatively associated with regaining remission (Table).

Conclusion: Clinical remission in routine care is achievable but relapses to states of low or moderate disease activity are common and may last several months. High disease activity and surrogates of active disease, such as need for biologics or corticosteroids, may predict those at high risk for relapse and justify close monitoring and potentially therapeutic intervention. Recapturing remission after a relapse appears possible but this target occurs with lower frequency than initial remission. Additional investigation about the optimal timing, dosing and sequence of DMARD therapy needed to maintain and recapture remission will inform how to manage and disease flares.

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What is the Rate of Primary and Secondary Failure of Anti-TNF in RA Patients? Data from a Rheumatoid Arthritis Cohort

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Objectives: Although most RA patients respond to anti-TNF treatment, some present with refractory disease (primary failure) while others show some initial clinical response and eventually lose responsiveness (secondary failure). Assessing primary/secondary failure is complex due to the use of different definitions and variations in the timing of patient assessment in real-life.

Methods: Patients from the Ontario Best Practices Research Initiative (OBRI) initiating anti-TNF treatment <30 days prior to or at any point post-OBRI enrolment were included. Those discontinuing anti-TNF due to primary failure or secondary failure, as per the judgment of the treating physician, were re-classified based on: (i) time of failure (<6 months, 6-12 months, >12 months); (ii) prior achievement of DAS28 low disease activity (LDA) or moderate/good EULAR response. Interruptions of <6 months, where patients restarted the same anti-TNF were counted as continuous drug use. Time to treatment discontinuation was assessed with Kaplan-Meier survival analysis.

Results: 9 patients (78.7% female) were included with a mean (SD) age 56.4 (12.8) years and disease duration of 9.6 (9.5) years at anti-TNF initiation. Mean (SD) disease parameters were: DAS28: 4.7 (1.4); SJC: 7.0 (4.8); TJC: 7.4 (6.6); physician global (0-10 NRS): 5.2 (2.3); patient global (0-10 NRS): 5.6 (2.7). After a mean (SD) follow-up of 13.1 (11.3) months, 124 (19.0%) patients were discontinued due to failure as per the treating physician [57 (46%) and 67 (54%) due primary and secondary failure, respectively]; with mean (SD) Kaplan-Meier-based time to failure of 59.4 (1.6) months. Re-classification based on the failure time showed that, among patients discontinued due to failure as per the treating physician, 32.3% were discontinued in <6

months of treatment, 28.2% at 6-12 months, and 39.5% after 12 months. In terms of treatment response, 32.8% achieved DAS28 LDA or moderate/good EULAR response prior to discontinuation due to failure by the treating physician (19.6% and 41.1% among patients discontinued due to primary and secondary failure, respectively; κ=0.22). Among patients discontinued within 6 months due to failure as per the treating physician, only 11.4% had previously shown response.

Conclusion: This analysis has shown that, among patients discontinuing anti-TNF treatment due to failure, the rate of secondary failure may range from 33% to 54% depending on the definition used, highlighting the need for standardization. Overall, there was good agreement between the physician assessment of early (<6 months) failure and prior (non)achievement of response but lower agreement in the assessment of secondary failure.

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Concomitant Use of Oral vs. Subcutaneous Methotrexate at Biologic Initiation: A Comparison of Biologic Treatment Survival in the Ontario Best Practice Research Initiative (OBRI) Cohort

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Objectives: Previous studies have shown differences in the effectiveness and survival of subcutaneous vs. oral methotrexate. Furthermore, concurrent methotrexate therapy has been shown to enhance the efficacy of anti-TNFs. The purpose of this study was to describe the pattern of methotrexate utilization in RA patients initiating biologic treatment in a large observational cohort and to compare the impact of methotrexate route of administration and dose on biologic durability in real-life.

Methods: Patients enrolled in the Ontario Best Practice Research Initiative (OBRI) initiating combination therapy with a biologic and methotrexate were included. Analysis was primarily descriptive. Cox regression was used to examine the impact of methotrexate route of administration and dose at baseline on biologic durability. Methotrexate dose was classified as low (≤15 mg/week), moderate (15-20 mg/week), and high (>20 mg/week).

Results: Among 2,585 RA patients enrolled in OBRI, 885 initiated biologic therapy. Of the latter, 517 (58.4%) were treated concomitantly with methotrexate and were included in the analysis. Mean (SD) age and disease duration were 55.8 (13.1) years and 9.2 (9.8) years, respectively, while the majority were females (78.9%) and treated with an anti-TNF agent (83.0%). Overall, 271 (52.4%) were treated with oral methotrexate and 236 (45.6%) with subcutaneous without any significant differences between biologic types. The predominant dose was 15-20 mg/week for oral methotrexate (43.2% of patients) and >20 mg/week for subcutaneous use (47.0%). Mean (SD) disease parameters at baseline were: DAS28 = 4.6 (1.4); swollen joint account = 6.3 (4.9); tender joint count = 6.9 (6.4); physician global = 5.1 (2.4); patient global = 5.3 (2.7). Over a mean (SD) follow-up of 1.8 (1.5 years) biologic discontinuation was reported for 39.5% of patients. Neither route of administration [HRSC-Oral (95%CI) = 1.2 (0.9-1.6)] nor dose [HRModerate-Low (95%CI) = 1.05 (0.74-1.49); HRHigh vs. Low (95%CI) = 1.08 (0.76-1.53)] of methotrexate at baseline were significantly associated with biologic discontinuation. Similar results were observed upon adjusting for gender, baseline age, disease duration, and DAS28.

Conclusion: This analysis has shown that subcutaneous methotrexate is used in Canadian routine care in a significant proportion of patients which is higher than that in other international registries. Neither route of administration nor dose of methotrexate were significant predictors of biologic durability despite the fact that previous studies have shown differences in efficacy when methotrexate is used without a biologic. Additional analyses considering changes over time in the mode of methotrexate administration are required to further validate these findings.

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CMA Rheumatology Wait Time Benchmarks: The Need to Tame the Queue across the Continuum of Care

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Objectives: The Canadian Medical Association's (CMA) Wait Times Alliance recently established wait time benchmarks for rheumatology consultations. Our aim was to quantify wait times to primary care and rheumatologist consultations for patients with rheumatic diseases.

Methods: We identified patients with referrals to Ontario rheumatologists in the Electronic Medical Record Administrative data Linked Database (EMRALD). To assess the full patient care pathway, dates of symptom onset, presentation in primary care, and referral were identified from the primary care electronic medical records (EMRs). Dates of rheumatologist consultations were obtained by linking with physician service claims. The duration of each phase of the care pathway (symptom onset to primary care to referral to rheumatologist consultation) was determined and compared with established benchmarks.

Results: Among 2430 referrals from 168 family physicians, 83% of patients were seen by 146 rheumatologists within one year. Overall, 2417 (99.5%) referrals occurred between 2005 and 2013. Wait times varied by condition. For systemic inflammatory rheumatic diseases (N=745; 31%), the total delay included 136 days for patients to access primary care after symptom onset, then 156 days for the family doctor to request referral, and 66 days from date of referral to rheumatologist consultation. The median time from referral to rheumatologist consultation for all referrals (N=2430) was 74 days. Comparing to established CMA wait time benchmarks (target being 100%), 38% of rheumatoid arthritis (RA) patients were seen by rheumatologists within four weeks of the date of referral (35% for other inflammatory arthritis), 63% of spondyloarthritis patients were seen within three months; and 34% of psoriatic arthritis patients were seen within six weeks. For RA patients, the median time to be seen by rheumatologists from symptom onset and date of referral was 327 and 66 days, respectively. Wait times from symptom onset to rheumatologist also varied amongst systemic conditions: the total delay being longest for crystal arthropathies and spondylitis. Regional variations in wait times were also observed across the province.

Conclusion: Established wait time benchmarks were not achieved for even the most urgent types of referrals (i.e. inflammatory arthritis including RA). Systemic inflammatory conditions were seen earlier compared to other types of referrals. However, most of the delay for these urgent

conditions occurred prior to referral, representing delays in patients seeking medical attention and family doctors waiting too long to refer patients who require earlier access. Targeted efforts are needed to promote more timely access to both primary care and rheumatology care.
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The Interferon Signature Correlates with Longitudinal Disease Severity in Systemic Lupus Erythematosus, but Adds Little to Conventional Prognostic Indicators

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Objectives: Type I interferon (IFN) is thought to play an important part in the pathophysiology of systemic lupus erythematosus (SLE), and cross-sectional data suggests an association between IFN-induced gene expression and SLE disease activity. However, interest in the IFN signature as a clinical biomarker has been tempered by a lack of fluctuation with disease activity over relatively brief durations (1-2 years) of follow up. In previous work we observed a significant reduction in the IFN signature in patients who had achieved prolonged clinical remissions off prednisone and immunosuppressives, as compared to relapsing and remitting SLE patients. This led us to question whether the IFN signature could act as a prognostic marker of disease severity.
Methods: IFN induced gene expression was measured in the whole peripheral blood at baseline in 73 SLE patients, using nCounter (NanoString) multiplexed profiling. The expression levels of five representative interferon responsive genes were summed to yield a composite IFN-5 score. Adjusted mean SLEDAI-2K, number of flares, mean steroid dose, immunosuppressive use, and change in SLICC/ACR damage index (SDI) were obtained for all patients over the subsequent five year period. Clinical outcomes were compared to the baseline IFN-5 score by linear regression.
Results: Of the 73 patients, 65 patients completed five years of follow-up, with 3 patients dying over the study period. As observed in previous studies, the IFN-5 score was positively associated with baseline disease activity ($p=0.0007$) and negatively associated with baseline age ($p=0.004$) and disease duration ($p=0.003$). Upon analysis of clinical outcomes over the subsequent 5 years, the baseline IFN-5 score demonstrated a significant positive association with the adjusted mean SLEDAI at the end of the study period ($p=0.003$), number of flares ($p=0.03$), and number of immunosuppressives used ($p=0.03$). There was also a positive trend between the IFN-5 score and mean steroid dose ($p=0.23$) and progression of damage ($p=0.46$). However, in a multivariate analysis incorporating conventional prognostic indicators including age, baseline disease activity, disease duration, immunosuppressive use, and the IFN-5 score, only age and baseline disease activity were independently associated with the outcome as measured by the adjusted mean SLEDAI-2K.
Conclusion: Although higher interferon scores correlate with several clinical markers of increased disease severity over the subsequent 5 years, they do not appear to be independently associated with disease severity. This suggests that measurement of the interferon signature may be of limited utility as a prognostic biomarker.

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Comparison of Adherence and Dosing Interval of Subcutaneous Anti-TNF Biologics in

Inflammatory Arthritis from a Canadian Administrative Database

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Objectives: The aim of this analysis was to compare adherence and dosing interval of subcutaneous (SC) anti-TNF agents such as Golimumab (GLM), Adalimumab (ADA), Etanercept (ETA) and Certolizumab pegol (CZP) in the treatment of inflammatory arthritis.

Methods: We used the IMS Brogan database which combined both private (PDP) and public drug plans databases of the provinces of Ontario (OPDP) and Quebec (RAMQ). Target drugs included SC anti-TNF biologics for indication of rheumatoid arthritis, ankylosing spondylitis, and psoriatic arthritis combined. The Index period was from January 1, 2010 - June 30, 2012. Patient selection criteria were adult patients newly prescribed a target biologic with at least three prescriptions and retained on therapy at 24 months. Recommended dose regimens as per the Canadian product monographs were used to compare actual vs. expected drug utilization. The compliance rate (MPR) was calculated as the estimated days' supply in the defined period divided by the number of days in the defined period. Patients who scored >80% were considered adherent. For dose-interval analysis, the average days between units was estimated by dividing the total days on therapy by the number of units the patient received. The total amount of drugs dispensed (in mg) were standardized at units as per the following: GLM: 50 mg; ADA: 40 mg; ETA: 50 mg; CZP: 200 mg. P-value obtained from Chi-square and Pair-wise comparison tests for statistical differences on the proportion of adherent patients; p-value < 0.05 is considered statistically significantly different.

Results: There were 4,035 new patients on target biologics with at least three prescriptions and retained on therapy at 24 months. The number of patients for each biologic was 683, 1400, 1765 and 187 for GLM, ADA, ETA and CZP, respectively. The data source was as follow: PDP national (N=2509), RAMQ (N=634) and OPDP (N=892). There was a greater proportion of GLM-treated adherent patients (n=595/683, 87%, $p<0.0001$) compared to ADA- (n=1044/1400, 75%), ETA- (n=1285/1765, 73%) or CZP-treated patients (132/187, 71%). We also investigated the number of patients receiving biologic at a shorter dosing interval. That proportion was similar between groups and was 5%, 6%, 12% and 4% in GLM- (≤26 days), ADA- (≤12 days), ETA- (≤6 days) and CZP-treated patients (≤12 days), respectively.

Conclusion: In this real life Canadian administrative database, GLM has better adherence compared to other SC biologics. The reason for this difference and impact on long-term outcomes are currently under investigation.

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Barriers Encountered in the Diagnosis of Pediatric Rheumatic Diseases in Kenya: A Focus Group Study

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Objectives: In a recent cross-sectional study conducted at Gertrude's Children's Hospital (GCH) in Nairobi, Kenya, the largest pediatric center in East-Africa, the number of cases of juvenile

idiopathic arthritis (JIA) and systemic lupus erythematosus (SLE) were underrepresented. We undertook this study to explore causes for the reduced frequency of JIA and SLE, to assess barriers encountered by local health care professionals in the diagnosis of children with these diseases, and to define strategies that could facilitate early diagnosis and treatment.
Methods: Twenty-three health care professionals from GCH participated in 5 focus group interviews (3 pediatricians, 5 general practitioners, 14 nurses and 1 physiotherapist). In addition, 5 physicians participated in structured one-to-one interviews. Content analysis was performed to determine themes emerging from this data.
Results: Four general themes linked to the low frequency of JIA and SLE at GCH emerged from the focus groups and interviews. Theme 1: Under-diagnosis of JIA and SLE related to (a) limited rheumatology knowledge of local health care professionals; (b) missed-diagnosis due to confounding diseases that are of high-priority such as infectious diseases; (c) presentations in their late stages (such as renal failure in lupus) and (d) perceived rarity of these diseases. Theme 2: Problems with ICD coding due to (a) common use of general instead of specific ICD codes; and (b) transition from manual to electronic records in the year the study was conducted. Theme 3: Diagnosis made by adult rheumatologist outside of GCH. Theme 4: Limited access to care related to (a) cost (i) that may lead patients to seek care at public hospitals and (ii) may limit diagnostic testing locally; and, (b) limited diagnostic resources. Four themes emerged as barriers. Barrier 1: Limited rheumatology knowledge/training among health care professionals. Barrier 2: Restricted access to rheumatology services due to a) the financial burden of patients, (b) limited diagnostic resources and (c) lack of rheumatology human resources. Barrier 3: Low index of suspicion due to confounders and other high-priority diseases. Barrier 4: Limited rheumatology awareness among the general public. Suggested strategies to facilitate early diagnosis and treatment of pediatric rheumatic diseases included enhancing rheumatology awareness amongst both the medical community and general public, improvement of access to rheumatology diagnostic services and access to local pediatric rheumatologists.
Conclusion: Promoting rheumatology training, raising awareness among primary care physicians and facilitating patients' access to care are key to enhancing early diagnosis and treatment of children with rheumatic conditions in East Africa.

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T-cell Subset Analysis in IgG4-Related Disease and Lymphocyte-variant Hypereosinophilic Syndrome

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Objectives: IgG4-related disease (IgG4-RD) and lymphocyte-variant hypereosinophilic syndrome (L-HES) share elevated peripheral eosinophilia and IgE levels as well as common clinical features including atopy, cutaneous lesions and lymphadenopathy. Distinguishing between these two diseases is a diagnostic challenge. L-HES is driven by an aberrant population of T lymphocytes characterized by an abnormal immunophenotype, clonal T-cell receptor rearrangements, or both. Determining whether there is overlap in the i immunophenotype of T-cells in IgG4-RD with L-HES will be helpful in the diagnosing and understanding the pathophysiology of these conditions.
Methods: IgG4-RD patients were biopsy proven according to consensus guidelines and HES

patients fit WHO criteria for HES including persistent blood eosinophilia >1,500/mm3 at a single Canadian academic center. There were 9 patients with L-HES and 11 patients with IgG4-related disease. Peripheral blood T-cell immunophenotyping was performed by multicolor flow cytometry using an antibody panel consisting of CD2, 3, 4, 7, 8, 45 and 56. Polymerase chain reaction was used to analyze T-cell receptor clonality.
Results: There were three IgG4-related disease patients with elevated CD4+/7- T-cell subsets median 14.5% (range 11-16.5; cut-off>10) and 6 additional IgG4-RD patients had normal subsets. Two IgG4-related disease patients had elevated NK cells. None of the IgG4-RD patients had a clonal T-cell receptor rearrangement by PCR. All nine L-HES patients had an abnormal phenotype, including increased CD4+/3- (n=4), CD4+/3-/8- (n=3), CD4+/7- (n=1) and increased NK cells (n=1). There were 5 HES patients, out of 8 total measured, with clonal T-cell receptor rearrangements by PCR, including the patient with an elevated CD4+/7- population.
Conclusion: Five of eleven patients with IgG4-RD had immunophenotypic abnormalities of the T-lymphocytes which overlap with the immunophenotypic abnormalities seen in L-HES. However, none of the IgG4-RD patients had a clonal T-cell rearrangement by PCR, indicating that the expanded CD4+/7- and NK populations seen in this disease are likely a nonspecific finding also seen in other inflammatory/autoimmune disorders.

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Clinical and Serum IgG4 Characteristics of a Unique British Columbian IgG4-Related Disease Cohort

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Objectives: IgG4-related disease (IgG4-RD) is a fibro-inflammatory disorder that is known to have protean manifestations and variably elevated serum IgG4 concentrations. We present the serum IgG4 characteristics and clinical features of a unique cohort of IgG4-related disease patients in British Columbia. Anecdotally, Asians seem to have more exuberant immunoglobulin production but this has not been formally studied to date.
Methods: All patients are residents of British Columbia and have biopsy proven IgG4-related disease according to consensus guidelines. Each patient underwent full history and physical examination by two IgG4-related disease physician experts. All patients underwent serum IgG4 levels by Nephelometry. Unpaired t-test was used for serum IgG4 comparisons.
Results: There were 19 patients with IgG4-related disease. The mean age at time of IgG4-RD diagnosis was 61 years old (range: 28-85) and the male:female ratio was 55:45. The time to diagnosis was lengthy at 9 years, on average, from start of symptoms. The organ involvement included salivary glands (n=7), lymph nodes (n=3), lacrimal gland (n=3), kidneys (n=2), genitourinary tumor (n=2), amongst others. Treatments included prednisone (n=10), rituximab (n=5), azathioprine (n=2), cyclosporine (n=2), fludarabine (n=1) and bortezomib (n=1). An additional 4 patients were undergoing observation only. Serum IgG4 levels were on average elevated at 10 g/L ± 9 (cutoff >1.25) as were IgG levels at 35 g/L ± 18 (cutoff >15.2). There was a statistically significant difference between IgG4-RD levels of Chinese and East Asians patients (n=10) averaging 13.8 g/L (range: 2.3-26.9) and Caucasians (n=9) averaging 3.0 g/dL (range: 0.418-9.75) (p=0.021).
Conclusion: This is a unique multi-ethnic cohort of IgG4-related disease patients in Canada.

There are statistically significant, possibly genetically related, differences in Asian and Caucasian serum IgG4 concentrations.

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Prevalence and Factors Associated with Non-traumatic Vertebral Fractures in Psoriatic Arthritis

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Objectives: The prevalence of osteoporotic vertebral fractures (VF) in psoriatic arthritis (PsA) is not known. We aim to determine the prevalence and factors associated with non-traumatic radiographic VF in patients with PsA.

Methods: The most recent digital plain radiographs of the thoracic and lumbar spine as well as demographic, clinical, laboratory and imaging information on a large cohort of patients diagnosed with PsA, satisfying CASPAR classification criteria, were retrieved from a database. Fractures were diagnosed by quantitative morphometric assessment (QMA) on lateral spinal radiographs of lumbar and thoracic spine (T6-L4) that was previously demonstrated to have high inter- and intra-assessor reliability. Covariates including demographic features, measures of disease activity, body mass index and pharmacologic treatment, particularly OP-causing treatments like corticosteroids and methotrexate were investigated as factors associated with VF in PsA using descriptive statistics and logistic regression.

Results: Data on 450 patients [191 (42%) females, mean age at the time of x-ray 54.4 ±13.6 years, mean PsA duration 18±11.9 years] were retrieved from the database. Only 24 (5.3%) patients (1 fracture-13, 2 fractures-9, >2 fractures-2) were diagnosed with VF. Univariate logistic regression analyses revealed that age (OR 1.08, 95% CI [1.04, 1.12], p value <0.0001), duration of psoriasis (OR 1.03, 95% CI [1.004, 1.062], p=0.027), PsA duration (OR 1.05, 95% CI [1.02, 1.09], p=0.002) and therapy with bisphosphonates (OR 4.92, 95% CI [1.29, 18.76], p=0.02) were associated with increased odds of the presence of VF, whereas race, sex, menopausal status, smoking, BMI, damaged joint count, presence of DISH, axial disease, enthesitis, dactylitis, time-averaged ESR, therapy with topical or systemic corticosteroids, NSAIDs, and methotrexate, HAQ and SF36 physical and mental component summary scores were not. Therapy with biologic agents showed a trend towards less odds of the presence of VF (OR 0.42, 95% CI [0.17, 1.02] p=0.056). Multivariate logistic regression analysis with backward elimination with age, sex, psoriasis and PsA duration, and therapy with bisphosphonates and biologics in the model revealed that only age (OR 1.08, 95% CI [1.04,1.12], P<0.0001) was independently associated with VF in PsA.

Conclusion: Prevalence of VF is low in PsA. Age is independently associated with the risk of VF. PsA related variables are not associated with the presence of VF in patients with PsA.

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The Prevalence of Anti-DFS70 Antibodies in an International Inception Cohort of Systemic Lupus Erythematosus Patients

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Objectives: Autoantibodies to the nuclear autoantigen dense fine speckles 70 (DFS70) are associated with a new paradigm whereby when found in isolation (monospecific – no other detectable autoantibodies), they are purported to rule out the diagnosis of systemic lupus erythematosus (SLE) and other anti-nuclear antibody (ANA)-related conditions. Anti-DFS70 can be screened by indirect immunofluorescence (IIF) and quantified and confirmed by chemiluminescence immunoassay (CIA). The reported frequency of anti-DFS70 by CIA in SLE is low compared to healthy individuals (0-6% vs. 7-20%). Furthermore, anti-DFS70 monospecificity is reported to be low in SLE (<1%). To date, there have been no studies examining the frequency of anti-DFS70 in early inception SLE cohorts. The purpose of this study was to determine the prevalence of anti-DFS70 in new SLE patients and to identify any univariate associations with demographic and clinical features.
Methods: Patients fulfilling the American College of Rheumatology (ACR) Classification Criteria for SLE were enrolled in the Systemic Lupus Erythematosus International Collaborating Clinics (SLICC) inception cohort within 15 months of diagnosis. Demographic and clinical data, including disease activity (SLEDAI-2K), were collected at enrollment. ANAs were detected by IIF on HEp-2 cells (ImmunoConcepts), and extractable nuclear antigens (ENAs) and double-stranded DNA (ds-DNA) by an addressable laser bead immunoassay (FIDIS Connective 13). Anti-DFS70 antibodies were measured by CIA using cutoffs suggested by the manufacturer (Inova Diagnostics Inc.).
Results: 1137 patients were included; 89.4% were female and 94.4% were ANA IIF positive. The frequency of anti-DFS70 by CIA was 7.1% [95%CI: 5.7-8.8%] (81/1137 patients). 11/1137 (0.97%) [95%CI: 0.5-1.7%] of the entire cohort were positive for anti-DFS70 only with no detectable ENA or anti-dsDNA and were therefore considered 'monospecific' for anti-DFS70. Patients with a negative anti-DFS70 by CIA were more likely than those with a positive anti-DFS70 to have other SLE-related autoantibodies including anti-U1-RNP (31.5% vs. 21.0%), anti-Ro60 (46.3% vs. 34.6%), and anti-SSB (16.0% vs. 4.9%). Age, gender, ethnicity, disease features included in the ACR classification criteria, SLEDAI-2K score, or concomitant therapies did not differ between the anti-DFS70 negative and positive patients.
Conclusion: The prevalence of anti-DFS70 measured by CIA in newly diagnosed SLE patients was at the high end of the range as compared to that in previously published SLE cohorts (7.1% vs. 0-6%). However, 'monospecific' anti-DFS70 was rare (0.97%) in this SLE inception cohort and, therefore, the presence of monospecific anti-DFS70 is a potentially useful test to discriminate between ANA positive healthy individuals and those newly diagnosed with definite SLE.

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The Wolf in the Water: Lupus vs. Lymphoma

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Systemic lupus erythematosus (SLE) and intravascular B-cell lymphoma (IVBCL) are both known as great disease "imitators". They can affect multiple organs and have variable presentations. We report a case of a SLE versus IVBCL in a patient presenting with progressive bilateral leg weakness and paresthesia with altered bowel and bladder function. Extensive investigations revealed several abnormal findings including transverse myelitis (TM) of his thoracic spine and a moyamoya pattern of his intracranial vessels with an area of subacute infarct. His lumbar puncture revealed elevated protein and presence of oligoclonal bands. He was

initially diagnosed with SLE on the basis of his TM, Jaccoud's arthropathy, Raynaud's phenomenon, leucopenia, and positive anti-nuclear antibody (ANA). After treatment with high dose steroids and plasmapheresis, his strength showed some improvement but the numbness and urine incontinence remained. He subsequently had a transurethral resection of his prostate and was incidentally found to have IVBCL in his biopsy. He was treated with a full course of rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone (R-CHOP) with methotrexate for presumed CNS lymphoma. The treatment however did not have any significant impact on his symptoms. To date, it remains unclear whether the patient's symptoms are attributed to SLE, IVBCL or both.

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Effectiveness and Safety of Golimumab in the Treatment of Ankylosing Spondylitis over a 12 Month Period

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Objectives: Although the efficacy and tolerability of golimumab (GLM) in patients with ankylosing spondylitis (AS) has been demonstrated in several controlled clinical trials, it is essential to assess the real-life effectiveness of therapeutic interventions in order to demonstrate true population-based benefits. The aim of this analysis was to describe the real-life effectiveness of GLM in AS patients in a Canadian routine clinical practice setting.

Methods: Biologic Treatment Registry Across Canada (BioTRAC) is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, ankylosing spondylitis, or PsA with infliximab or GLM. Eligible people for this analysis included AS patients treated with GLM enrolled since 2010. Descriptive statistics were produced for clinical outcome measures and patient reported outcomes over 12 months of treatment. Within-group changes were assessed for statistical significance with the paired-samples Student's t-test. Safety was assessed with the incidence of adverse events (AEs)/100 patient-years.

Results: A total of 206 AS patients were included in this analysis with a mean (SD) age of 45.6 (13.9) years and disease duration since diagnosis of 5.7 (10.2) years, the majority were male (61.2%) and 93.2% were biologic naïve. After six months of treatment, statistically significant ($P<0.001$) and clinically meaningful improvements were observed for all disease parameters and were sustained over 12 months of treatment ($P<0.001$). Mean (SD) disease parameters at baseline and 12 months of treatment are shown in Table 1. Clinically important improvement in ASDAS (change ≥ 1.1) by 6 and 12 months was 46.6% and 40.0%, respectively; major improvement (change ≥ 2.0) was achieved by 13.8% and 25.0% respectively. The proportion of patients who achieved ASDAS inactive disease (ASDAS <1.3) increased from 2.6% at baseline to 21.2% at 12 months; while very high disease activity (ASDAS >3.5) decreased from 44.4% to 21.2%, respectively. A total of 282 AEs (215.8 events/100 patient-years) were reported by 105 (51.0%) patients and 23 serious AEs (SAEs) (17.6 events/100 patient-years) by 20 (9.7%) patients. The incidence of serious infections and malignancies were 2 (1.5 events/100 patient-years) and 1 (0.8 events/100 patient-years), respectively. There were no deaths reported during the course of the study.

Conclusion: The results of this Canadian longitudinal observational study have shown that GLM

is well tolerated and effective in reducing symptom severity and improving disease outcomes in AS patients over a 12 month period.

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Patients who Fail to Achieve Minimal Disease Activity (MDA): What is Done? An Analysis from a Prospective, Observational Registry

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Objectives: MDA is now considered an objective target which is more attainable in psoriatic arthritis (PsA), compared to remission which is more difficult to achieve and maintain. The aim of this analysis was to assess the frequency of treatment optimization in cases where MDA was not achieved and to describe the type of changes made in PsA patients initiating treatment with infliximab (IFX) or golimumab (GLM) in Canadian routine clinical care.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment with IFX or GLM. Eligible patients for this analysis included PsA patients treated with IFX (from 2010) or GLM (from 2006) until 2015. MDA was defined as the fulfillment of ≥5 of the following criteria: TJC28≤1, SJC28≤1, PASI≤1, pain (VAS) ≤15 mm, PtGA (VAS) ≤20 mm, HAQ≤0.5, tender entheseal points ≤1.

Results: A total of 261 patients were included (88.5% bionaive), with a mean (SD) age and disease duration of 50.0(12.0) and 5.2(6.8) years, respectively. Nearly half of patients were female (48.3%) and the majority of patients were treated with GLM (57.9%). At 6, 12, 18, and 24 months, 43.5%, 44.8%, 47.9%, and 52.5% of patients, respectively, had MDA. Among the total cases where MDA was not achieved (n=202), concomitant use of DMARDs was reported for 76.2% (MTX:62.9%, LEF:8.4%) and treatment was adjusted in 25.7%. The most common treatment change was DMARD addition/replacement (7.9% of all non-MDA cases), followed by steroid initiation (6.9%), DMARD uptitration (6.4%) and anti-TNF uptitration (6.4%), DMARD initiation (5.9%), and NSAID initiation (4.5%). Among cases where MDA was achieved (n=173) anti-TNF treatment was down-titrated in one case (0.6%). Treatment adjustment was more frequent with IFX as compared to GLM (29.8% vs.20.5%; P=0.131), particularly with respect to anti-TNF dose uptitration (11.4% vs.0%; P=0.001) and NSAID initiation (7.9% vs.0%; P=0.007). No statistically significant differences were observed across provinces with the exception of NSAIDs which were more frequently initiated in the Maritime (16.7% of cases compared to ≤4% in all other regions; P=0.006).

Conclusion: These results suggest that, whether MDA is achieved or not, anti-TNF treatment is optimized in only a minority of cases among PsA patients in Canada. These rates may be underestimated because potential changes in steroid and NSAID dose and type could not be taken into consideration. MDA is not currently part of routine assessment, and future research could investigate the evolution of this objective target's use in clinical practice.

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#MakeRheum for Rheumatology: Testing Novel Ways to Increase Interest in Rheumatology by Canadian Undergraduate and Postgraduate Medical Trainees

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Objectives: To share learnings from the first pan-Canadian meeting of the CRA-funded "Training the Rheumatologist for Tomorrow: Addressing Human Resource Needs" research project.

Methods: Representatives from all Canadian postgraduate Rheumatology programs were invited to attend a formal meeting to initiate Phase Two of an ongoing research project. In May 2015 project staff organized and hosted a meeting near Toronto where attendees identified novel ways to educate, attract and expose trainees to the field of Rheumatology. The meeting was designed to promote the study aim of increasing exposure to, and understanding of, Rheumatology by undergraduate and postgraduate medical trainees. The ultimate goal is to address the shortage of rheumatologists by increasing the number of students pursuing a career in Rheumatology.

Results: 16 representatives from nine programs attended the meeting.* Attendees learned about the activities and results from Phase One of the project and then heard about ongoing work by the ORA to increase the presence of Rheumatology in underserved areas of Ontario. Participants formed four working groups to identify possible ways to increase medical trainees' interest in Rheumatology. Planned activities include: streamlining the way that Rheumatology programs match undergraduate students interested in a Rheumatology selective creating an online template and package of material to assist programs interested in hosting special events related to Rheumatology enhancing the way that information for trainees is presented on the CRA website developing new marketing messages for a range of audiences in order to familiarize both trainees and the general population with the field of Rheumatology. Feedback from the meeting revealed that attendees appreciated the opportunity to learn what each program is doing to attract more trainees and messages that could increase interest in Rheumatology. Meeting in person and working collaboratively to identify champions and set goal dates were seen as important ways to maintain momentum. *Attendees were from the CRA, the ORA, and the following Rheumatology programs (listed from West to East): UBC, Calgary, Alberta, Saskatchewan, Western, McMaster, Toronto, McGill, Dalhousie.

Conclusion: There is a need for renewed efforts to strengthen the presence of Rheumatology in ways that are evidence-based and replicable across Canada. As a response, the above-named activities are being developed and pilot tested for nationwide evaluation by spring 2016. Findings will be shared at the CRA 2016 annual scientific meeting.

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Hypereosinophilia and Stroke as First Presentation of SLE

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Objectives: We report a case of systemic lupus erythematosus (SLE) presenting with hypereosinophilia and stroke, the reviewed literature of SLE presenting with hypereosinophilia, and an outline of neurologic manifestations of hypereosinophilia.

Case: A 66 year old previously healthy male presented to hospital with a stroke in the setting of 4 months of constitutional symptoms and sinusitis. He was found to have hypereosinophilia and a strongly positive anti-dsDNA. Neurologic imaging showed multiple small cortical infarcts involving both the anterior and posterior circulation and suggested either cardioembolic stroke or vasculitis as possible causes. No evidence for a cardioembolic source was found and given the concern of vasculitis he was treated with pulse IV steroids followed by an oral prednisone taper without additional immunosuppression.
There was no clear etiology for his hypereosinophilia. No parasitic infection was found and the bone marrow only revealed eosinophilia. He had sputum eosinophils on PFTs with no history of asthma, eosinophilic granulomatosis with polyangiitis (EGPA), or allergic bronchopulmonary aspergillosis (ABPA). Perinuclear anti-neutrophil cytoplasmic antibody (p-ANCA) was positive but both PR3 and MPO were negative. CT scan of his chest initially showed bronchiectasis and non-specific ground-glass opacification but repeat CT a month after admission showed subpleural cavitating lung lesions thought to have developed secondary to a methicillin-resistant Staphylococcus aureus (MRSA) infection that developed 4 days after admission.
One month after admission the patient was discharged home in stable condition. Follow up examination 7 months later found the patient well with ongoing strongly positive anti-dsDNA and a new strongly positive ANA. He had no symptoms consistent with vasculitis and normal inflammatory markers despite no ongoing immunosuppression making the diagnosis of vasculitis less likely. We have diagnosed him with early SLE and started him on daily hydroxychloroquine with close follow-up.
Conclusion: We present a rare case of symptomatic and unexplained hypereosinophilia in a patient whose presentation and strongly positive ANA and anti-dsDNA leads us to consider that this is an early presentation of SLE.

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Rheumatic and Non-Rheumatic Autoimmune Diseases in SLE Offspring

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Objectives: Autoimmune diseases (AID) have familial aggregation and frequently share a common genetic predisposition. Only few small uncontrolled studies have evaluated the risk of AID in SLE offspring, with inconsistent results. In a large population-based study, we aimed to determine if children born to mothers with SLE have an increased risk of rheumatic and non-rheumatic AID compared to children born to mothers without SLE.
Methods: The "Offspring of SLE mothers Registry (OSLER)" includes all women who had ≥1 hospitalization for delivery after SLE diagnosis, identified through Quebec's universal healthcare databases (1989-2009). OSLER also includes a randomly selected control group of women, matched at least 4: 1 for age and year of delivery, who did not have a diagnosis of SLE prior to or at the time of delivery. We identified children born live to SLE mothers and their matched controls, and ascertained rheumatic (i.e. juvenile idiopathic arthritis, SLE, systemic sclerosis, Sjögren's disease, inflammatory myositis, systemic vasculitis) and non-rheumatic (i.e. type 1 diabetes, inflammatory bowel disease, psoriasis, celiac disease, autoimmune thyroid disease, myasthenia gravis, multiple sclerosis) AID based on ≥1 hospitalization or ≥2 physician visits with a relevant diagnostic code, at least 2 months apart but within 24 months. We performed multivariate analyses to adjust for maternal age, education, and ethnicity, as well as calendar

year of birth and sex of the child.
Results: 509 women with SLE had 719 children, while 5824 matched controls had 8493 children. Mean follow-up was 9.1 (SD 5.8) years. Compared to controls, children born to mothers with SLE had similar records of rheumatic diagnoses [0.14% (95% CI 0.01, 0.90) vs 0.19% (95% CI 0.11, 0.32)]. However, there was a trend towards more non-rheumatic AID in offspring of mothers with SLE versus controls [1.11% (95% CI 0.52, 2.27) vs 0.48% (95% CI 0.35, 0.66)]. In multivariate analyses, children born to mother with SLE had a substantially increased risk of non-rheumatic AID compared to controls (OR 2.62, 95% CI 1.10, 6.24), while results were inconclusive for the risk of rheumatic AID (OR 0.78, 95% CI 0.10, 5.92).
Conclusion: These novel data suggest that, compared to children from the general population, children born to women with SLE have an increased risk of non-rheumatic AID. Our effect estimate for the risk of rheumatic AID is inconclusive. Further study of these children, throughout late childhood, adolescence, and adulthood, would be additionally enlightening.

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Increased Risk of Allergic Conditions in Children Born to Women with SLE

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Objectives: Limited evidence (i.e. a handful of small observational studies) suggests a potentially increased risk of allergic conditions in offspring born to women with SLE. In a large population-based study, we aimed to determine if children born to SLE mothers have an increased risk of allergic conditions compared to children born to mothers without SLE.
Methods: The "Offspring of SLE mothers Registry (OSLER)" includes all women who had ≥1 hospitalization for delivery after SLE diagnosis, identified through Quebec's universal healthcare databases (1989-2009). OSLER also includes a randomly selected control group of women, matched at least 4: 1 for age and year of delivery, who did not have a diagnosis of SLE prior to or at the time of delivery. We identified children born live to SLE mothers and their matched controls, and ascertained allergic conditions (including asthma, allergic rhinitis, eczema, cutaneous allergy, urticaria, angioedema, and anaphylaxis) based on ≥1 hospitalization or ≥1 physician visit with a relevant diagnostic code. We performed multivariate analyses to adjust for maternal age, education, race/ethnicity, and obstetrical complications, as well as calendar year of birth and sex of the child. Moreover, in a subsample analysis of children with maternal public drug coverage throughout pregnancy, we further adjusted for maternal use of antimalarials, corticosteroids, and immunosuppressive drugs.
Results: 509 women with SLE had 719 children, while 5824 matched controls had 8493 children. Mean follow-up was 9.1 (SD 5.8) years. As opposed to controls, children born to mothers with SLE experienced slightly more allergic conditions [66.1% (95% CI 62.5, 69.5) versus 59.3% (95% CI 58.3, 60.4)]. In SLE offspring, the most frequently observed allergic conditions were eczema (43.8%) and asthma (28.5%), while anaphylaxis was the least frequent (0.8%). In multivariate analysis (n=9212), children born to SLE mothers had an increased risk of allergic conditions versus control children (OR 1.36, 95% CI 1.14,1.61). In the subsample analysis further controlling for relevant maternal medications (n=1925), though a trend remained for increased risk of allergic conditions for offspring of SLE mothers versus controls, due to reduced sample size the 95% CI was wider and included the null value (OR 1.23; 95% CI 0.79,

1.91).
Conclusion: Compared to children from the general population, children born to women with SLE may have an increased risk of allergic conditions. Genetics, shared environmental exposures, as well as in utero exposure to maternal autoantibodies and cytokines might be at play.

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Case Series of Macrophage Activation Syndrome in Adults with Rheumatic Diseases

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Objectives: Macrophage activation syndrome (MAS) is a rare life-threatening condition characterized by fever, hepatosplenomegaly, cytopenias, coagulopathy and liver dysfunction. MAS is well-described in systemic juvenile inflammatory arthritis (sJIA), but may go unrecognized in adults with rheumatic diseases. The objective of this project was to describe a local case series of adults with MAS, including clinical features, treatment and outcomes.
Methods: A retrospective chart review of all adult cases of MAS diagnosed since 2009 by rheumatologists at our centre was performed. Data was collected on age, sex, primary diagnosis, disease duration and disease activity at time of MAS, physical and laboratory features, treatment and outcome. Preliminary diagnostic guidelines for MAS, ACR criteria, SLICC damage index and SLEDAI scores were recorded.
Results: Over 6 years, 5 females and 4 males were diagnosed with MAS, including 6 SLE, 2 Adult Still's Disease (ASD) and 1 sJIA with MAS flare as an adult. The mean±SD age was 35±15 years and median disease duration was 2 years (range 0 to 33 yrs). MAS was a presenting feature at the time of diagnosis in 3 of 6 SLE cases and 1 ASD patient. The mean SLEDAI score at MAS diagnosis was 16±7.4, indicative of active SLE. The mean SLICC damage index was 2.2±2.4. All lupus patients had a positive ANA, immune serology, and hematologic abnormalities, while 5 (83%) had laboratory evidence of nephritis and 3 (50%) had arthritis and malar rash. The most frequent clinical features of MAS were fever, lymphadenopathy, and central nervous system dysfunction. The maximum ferritin level ranged from 2,150 to 100,000 (median 11,892) µg/L. Other lab markers were elevated, including LDH (1273±757 U/L), ALT (247±239 U/L), CRP (138±102 mg/L) and ESR (61±42 mm/hr). All patients received both oral and IV pulse steroids; 8 had anakinra; 5 cyclosporin; 4 IVIG; and 1 rituximab. Outcomes were good in 7 cases, but 2 patients died.
Conclusion: SLE was the most common rheumatic disease associated with MAS in adults. MAS occurred at the first presentation of SLE or ASD in 4 (44%) cases. A high index of suspicion is required to diagnose MAS due to overlapping features of MAS with rheumatic diseases. The presence of fever, cytopenias, hyperferritinemia and liver dysfunction should raise suspicion of MAS. Validated criteria to diagnose MAS early in adults with rheumatic disease, and appropriate management strategies are urgently needed.

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Assessing Gout Quality Indicators in Electronic Medical Records: A Feasibility Study

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Objectives: The growing popularity of electronic medical records (EMRs) - used by 75% of Canadian physicians - has spurred recent questions regarding their utility in quality

improvement. This may be particularly relevant in gout, where quality indicators (QIs) have been developed and validated by gout experts. Our objective was to evaluate the feasibility of using EMR data to assess QIs for gout by 1) operationalizing the translation of EMR data into QIs; and 2) determining whether sufficient data is available in the EMR for QI assessment.
Methods: Using EMRs from three rheumatology clinics in Vancouver, British Columbia, we identified gout patients seen between January 01, 2012 and December 31, 2013. De-identified data on medical conditions, medications, laboratory tests, radiologic tests, and clinical notes were mined to determine which of the ten published QIs for gout can be assessed from the EMR, whether through automated extraction from specific fields or text search functions. These QIs span use of urate-lowering therapy [QI#1: use with renal impairment; QI#2: dosing with thiopurines; QI#3: use with no renal impairment; QI#4: asymptomatic hyperuricemia; QI#5: use with renal insufficiency or history of nephrolithiasis; QI#6: use in hyperuricemia and gouty arthritis; QI#7: monitoring], lifestyle modifications [QI#8: obesity/alcohol], and use of anti-inflammatory agents [QI#9: use; QI#10: monitoring]. We then determined the proportion of patients for whom there were sufficient EMR data for QI assessment.
Results: The study comprised 191 gout patients, with 63% males and mean age ± 17 years. There were sufficient EMR data to assess seven of the ten gout QIs (QIs 1, 3, 5, 7, 8, 9 and 10), an improvement from prior studies using administrative data that were only able to assess up to three QIs. QIs representing use of medications had the highest data availability rates; 69% of patients had sufficient EMR data to assess QI 1, 79% for QI 3, 70% for QI 5, 83% for QI 7, 71% for QI 9 and 75% for QI 10. Only 8% of patients had sufficient EMR data to assess QI 8.
Conclusion: To our knowledge, this is the first study to evaluate the feasibility of EMR data in assessing QIs for gout. Our study has implications for recommendations to rheumatologists to ensure completeness of data entry for QI assessment as well as to EMR providers for data capture. Overall, EMRs are feasible and promising tools for assessing QIs for gout.

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Assessment of the Temporal Variation of the Fibromyalgia Patient Profile between 2005 and 2013: Do Guidelines Inform Clinical Care?

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Objectives: In the last decade, interest in fibromyalgia (FM) has increased with the publication of revised diagnostic criteria and clinical guidelines. The 2010 and revised 2011 ACR criteria emphasized the polysymptomatic nature of FM. National FM guidelines (Germany, Canada and Israel) showcased the importance of sustained functionality, multimodal therapy ideally targeting the primary symptom/s and cautioned the likely modest effect for most drug treatments. Whether recommendations influenced clinical care remains speculative. We examined the profile and clinical care of FM Canadian patients in two time periods to assess the effect of this paradigm change.
Methods: FM patients followed prospectively at a Montreal university-based tertiary-care pain clinic during 2005-2013 were recruited. Disease severity was measured with pain visual analog scale (VAS), patient global assessment (PGA), McGill Pain Questionnaire (MPQ), Pain Disability Index (PDI), Pain Catastrophizing Scale (PCS), Fibromyalgia Impact Questionnaire (FIQ), Health Assessment Questionnaire (HAQ) and Arthritis Impact Measurement Scales (AIMS) the latter including anxiety and depression subscales. Differences between enrolment

period groups (2005-2008 vs. 2009-2013) were assessed for statistical significance with the chi-square test for categorical variables and the independent-samples t-test for continuous variables.
Results: A total of 248 FM patients were included and stratified by enrolment period: 147 patients in 2005-2008 and 101 patients in 2009-2013. The mean (SD) age of patients was 47.9 (10.3) years [2005-2008 vs. 2009-2013: 49.3 (9.71) vs. 45.9 (10.94); p=0.012]. The majority (91.1%) of patients were female (p=0.179). Mean (SD) disease duration was 10.8 (9.80) years (p=0.851). Significant between-group differences (2005-2008 vs. 2009-2013) of mean (SD) scores were observed for PDI [36.1 (15.10) vs. 40.0 (13.21); p=0.036], FIQ [65.1 (18.24) vs. 69.8 (14.18); p=0.029] and AIMS depression [5.1 (1.) vs. 4.5 (2.05); p=0.005]. Statistical trends were observed in regard to medication use: 2005-2008 patients used more analgesics (24.5% vs. 15.8%; p=0.114) and NSAIDs (26.5% vs. 17.8%, p=0.126) but less antiepileptics (27.9% vs. 38.6%; p=0.097). Exercise activity was more prevalent among 2009-2013 patients (23.8% vs. 39.6%; p=0.011). The 2009-2013 group had lower disability rates (39.5% vs. 18.8%; p=0.001) and lower employment rates in manual and service areas (37.2% vs. 16.3%) (p=0.012).
Conclusion: FM patient profile changes in the past decade may have been informed by recent guidelines. Despite similar pain durations at presentation and generally greater symptom severity, FM management has trended away from traditional analgesic medication use. Maintained function with more patients employed and participating in exercise activity reflects the evolving concept of FM care.

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The Early Arthritis Screening and Treatment (EAST) Program for Eastern Quebec Improves Inflammatory Arthritis Care.

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Objectives: The objective of the EAST program was to improve the trajectory of care for patients with inflammatory arthritis (IA) in Eastern Quebec. Specific aims were to: 1) train a team of allied health professionals to perform a focused joint examination and be proficient in the care of IA; 2) document key quality indicators of performance; and 3) educate stakeholders about the importance of early and accurate diagnosis of IA.
Methods: The EAST clinical team was created with support from the CHU de Québec that allowed dedicated time from one nurse and two physiotherapists. Descriptive statistics of the number of new referrals and follow-up visits were generated for the period before and after starting the EAST program and the following key performance indicators were measured: a) time from referral to first visit and proportion achieving recommended guidelines of 4 weeks and b) time from referral to first DMARD.
Results: At baseline, 441 new referrals for AI were late in scheduling their first visit. The number of patients seen monthly at the CHU de Québec increased over the 18 months of the study. The wait times for two key indicators of performance have decreased for the time from referral to time to starting methotrexate at 125 days down from 154 days. There was an increase in the number of patients seen by a rheumatologist within 4 weeks from referral (39% vs 57%) and who started a DMARD within 12 weeks from their referral (wait time [mean (sd)] went down from 155 (277) to 125 (139) days). Eighteen months after the first triage clinic, the effects

are sustained. As expected, the number of follow-up visits increased and specific solutions to manage this extra care load are in development.
Conclusion: The care pressure for patients with IA at the CHU de Québec exceeded the capacity for specialized care to meet this need and new models of care were needed. This CIORA pilot project has allowed rheumatology to become a priority within our hospital. Documentation of the lengthy delays and the enormous referral pressure has led to a LEAN exercise for the intra-hospital trajectory of rheumatology care and to a kaizen workshop. Once the care for rheumatology patients at the CHU de Québec is optimized, we plan to work with community resources and with primary care teams to promote the development of an integrated trajectory of care for patients with inflammatory arthritis. Supported by a CIORA grant.

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Audit and Feedback of Patient Reported Outcomes in Knee Osteoarthritis to Improve Management in Primary Care: A Pilot Project

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Objectives: Osteoarthritis (OA) affects 13% of the Canadian population and is expected to increase over the next decades. There are evidence based guidelines for the management of knee OA but these are infrequently applied in practice for various reasons. The aim of this pilot project was to improve the quality of care of knee OA in a primary care practice.
Methods: Iterative PDSA cycles were used to optimize processes for systematic measurement of patient-reported outcomes and feedback of actionable information to clinicians. Patients with knee OA were surveyed regarding their care to date using the OA QI Questionnaire, as well as their level of knee pain and function (using the ICOAP and WOMAC-5 respectively). Following an algorithm, a tailored response was delivered directly to patients and an e-consult with specific recommendations was sent to the primary care provider. The same set of surveys were distributed four months later to assess if the OA care and knee pain and function had improved.
Results: There were 85 patients with knee OA in the pilot project. 50 patients (58.8%) completed the initial survey and 37 patients (43.5%) completed the 4 month follow up survey. The baseline OA QI score was 61% and the four month follow up OA QI score was 70%. There was no change in any of the subcategories on the OA QI questionnaire. The consult notes recommended 55 total interventions: 19 patients received at least one intervention and there were a total of 31 interventions completed. The most common intervention completed was an occupational therapy referral or MD visit to address OA.
Conclusion: The average OA QI score at baseline was 61% and the audit and feedback of patients' symptoms and care to date with recommendations for improvement did not change the QI scores, or pain and function level of patients. However, during the pilot numerous PDSA cycles were completed to make changes to the process and to clarify patient responses and recommendations. This pilot project and the changes completed formed the basis for a large scale implementation to all patients with knee OA in the family practice.

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From Plague to Pets: A Case of Rate-bite Fever

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Introduction: Rat-bite fever is a rare zoonotic infection caused by Streptobacillus moniliformis and Spirillum minus. It is characterized by fever, rash and arthralgias. Rat-bite fever is a

misnomer because rat bites are not always documented. Close contact through a kiss, small scratch or food sharing is sufficient for transmission. Fifty to one hundred percent of rats are colonized in the nasopharynx. Historically, rat-bite fever was more commonly seen in laboratory technicians and in those with low socioeconomic status, but more recently children account for 50% of the cases in the United States. This is largely in part to the growing popularity of rats as pets.

Case: 67-year-old women admitted to hospital with decreased level of consciousness. She has a history of alcohol and Listerine abuse. Her living situation alternates between the Salvation Army and the streets. On examination, she had symmetric polyarthritis and small raised papules on her hands.

Blood cultures grew streptobacillus moniliformis. A left knee aspirate showed inflammatory range cell count 6.9x109/L, with 80% neutrophils. The gram stain and culture were negative. She was treated with penicillin for 14 days.

Discussion: Streptobacillus moniliformis is not a reportable pathogen and so there is limited information on its incidence. The presentation of fever, rash, and arthralgias evokes a broad differential diagnosis. As seen in our patient, many case reports of rat-bite fever do not yield a positive culture as the organism is rarely isolated from synovial fluid. One explanation for this is that it is an immunological response. The other thought is that the arthritis is due to direct infection of the joint causing suppurative arthropathy as supported by case reports with positive cultures. Additionally, Streptobacillus moniliformis is an extremely fastidious organism that needs special conditions to grow. It is interesting to note the low rate of arthrotomy considering that septic arthritis often requires surgical intervention.

Conclusion: Rat-bite fever should be considered in the differential diagnosis of patients with unexplained fever and polyarthralgia. Furthermore, due to the growing popularity of pet rats, pediatricians should suspect rat-bite fever following exposure with the triad of fever, petechial-purpuric rash and arthralgias. Because the microbiological diagnosis can be difficult to make, clinicians should contact their microbiology lab to enhance detection of the organism when rat-bite fever is suspected. This stresses the importance of good communication between clinical and laboratory staff.

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Ribbing's Disease Compared to Intramedullary Osteosclerosis: A Case Presentation

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Background: Ribbing's disease is a rare hereditary sclerosing bone dysplasia. It is characterized by sclerosis and the formation of new bone in the diaphysis of long bones, predominantly in the lower limbs. In contrast, intramedullary osteosclerosis, although rare, does not have a hereditary bias. It is characterized by intramedullary osteosclerosis in the long bones of the lower extremities without extensive periosteal new bone formation.

Case Presentation: We present a 38 year old female who was referred with gradual pain and swelling of her right tibia. There was no history of prior trauma. She had no past medical history and was on no medications. There was no history of any infectious symptoms including fever, chills, night sweats or weight loss. Her initial laboratory bloodwork including Alk Phos, PTH and calcium were normal. She had a TB skin test which was negative.

Initial imaging with a CT scan of her right lower limb demonstrated extensive medullary sclerosis of the right tibial shaft along with evidence of cortical thickening and periosteal new bone. A subsequent MRI confirmed a mid tibial sclerotic abnormality with smooth periosteal

reaction within the diaphysis and raised the possibility of intramedullary osteosclerosis vs. Ribbing's disease. Additionally, although less likely, was the possibility of chronic osteomyelitis. A bone scan was performed which showed increased uptake but lack of hyperemia at the right tibia. This combination of findings helped rule out osteomyelitis. A repeat MRI demonstrated increased cortical and medullary sclerosis centered in the mid tibial diaphysis along with subtle generalized periosteal reaction and bone marrow edema. Based on the imaging, Ribbing's disease was favoured as periosteal reaction and bone marrow edema are rarely seen in intramedullary osteosclerosis. A bone biopsy was offered but she declined to proceed.
She was treated with Naproxen 500mg PO once daily and Lansoprazole 30mg PO once daily. This was partially successful but she continued to have persistent pain in her right calf which was resistant to NSAID therapy. Treatment with Duloxetine did provide a modest improvement in her leg pain and swelling. She has since been started on Actonel DR, and repeat imaging will be performed in the upcoming months.
Conclusions: This case helps highlight the clinical difficulty in differentiating between intramedullary osteosclerosis, hereditary skeletal dysplasias such as Ribbing's disease and alternative etiologies including infection. Differentiated these etiologies is important as treatment differs with bisphosphonates favoured for Ribbing's disease and NSAIDs preferred for intramedullary osteosclerosis.

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Apremilast, an Oral Phosphodiesterase 4 Inhibitor, is Associated with Long-term (104-Week) Improvements in Enthesitis and Dactylitis in Patients with Psoriatic Arthritis: Pooled Results from Three Phase III, Randomized, Controlled Trials

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Objectives: PALACE 1, 2, and 3 (NCT01172938, NCT01212757, and NCT01212770) evaluated apremilast (APR) efficacy/safety in patients with active psoriatic arthritis (PsA). We report the impact of APR treatment on enthesitis and dactylitis, hallmark features of PsA, over 104 weeks in a pooled analysis of PALACE 1-3.
Methods: Patients were randomized (1:1:1) to placebo, APR 30 mg BID (APR30), or APR 20 mg BID (APR20). From Weeks 24-52, all patients received double-blind APR30 or APR20 treatment; a 4-year open-label extension phase is ongoing. Pre-planned analyses examined data pooled across PALACE 1-3 at Week 24 from patients with pre-existing enthesopathy and/or dactylitis, based on the Maastricht Ankylosing Spondylitis Enthesitis Score (MASES) (range: 0-13) and dactylitis count (range: 0-20). Analyses at Week 24 used LOCF for missing values; Weeks 52 and 104 were based on data as observed.
Results: Among patients with enthesitis (n=915) or dactylitis (n=610) at baseline and ≥1 post-baseline value, mean MASES ranged from 4.4-4.8 and mean dactylitis counts ranged from 3.2-3.4 at baseline. At Week 24, mean changes in MASES were −1.3 (APR30 vs. placebo; P=0.0194), −1.2 (APR20), and −0.9 (placebo); MASES mean%/median% changes were

−23.6%/−50.0% (P<0.05, APR30 vs. placebo), −19.3%/−40.0% (APR20), and −7.0%/−21.1% (placebo). MASES=0 was achieved by 27.5% (APR30), 27.4% (APR20), and 22.5% (placebo) of patients. Mean changes in dactylitis count were −1.8 (P=0.0097, APR30 vs. placebo), −1.6 (APR20), and −1.3 (placebo); mean%/median% changes in dactylitis count were −48.6%/−79.3% (APR30), −43.2%/−75.0% (APR20), and −38.2%/−66.7% (placebo). Dactylitis count=0 was achieved by 46.2% (APR30), 45.9% (APR20), and 39.0% (placebo) of patients. With continued APR treatment, long-term improvement in enthesitis and dactylitis severity was seen, marked by mean/mean%/median% reductions in MASES at 52 weeks (APR30 [n=377]: −2.0/−43.5%/−66.7%; APR20 [n=326]: −2.2/−42.2%/−66.7%) and 104 weeks (APR30 [n=302]: −2.6/−57.5%/−85.7%; APR20 [n=261]: −2.6/−55.2%/−100.0%) and dactylitis counts at 52 weeks (APR30 [n=249]: −2.5/−67.9%/−100.0%; APR20 [n=225]: −2.3/−70.2%/−100.0%) and 104 weeks (APR30 [n=200]: −2.9/−80.0%/−100.0%; APR20 [n=182]: −2.4/−75.6%/−100.0%). MASES=0 was achieved at Weeks 52 and 104 by 37.7% and 48.7% (APR30) and 41.1% and 51.7% (APR20) of patients. Dactylitis count=0 was achieved at Weeks 52 and 104 by 67.5% and 77.5% (APR30) and 66.7% and 72.5% (APR20) of patients. Over 104 weeks, most adverse events (AEs) were mild or moderate in severity; no increase was seen in AE incidence and severity.
Conclusion: Over 104 weeks, APR demonstrated continued efficacy in PsA treatment, including improvements in enthesitis and dactylitis, and was generally well tolerated.

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A Randomized, Double-blind, Active- and Placebo-controlled Phase 3 Study of Efficacy and Safety of Ixekizumab, Adalimumab, and Placebo Therapy in Patients Naïve to Biologic Disease Modifying Antirheumatic Drugs with Active Psoriatic Arthritis

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Objectives: Psoriatic arthritis (PsA) is a chronic immune-mediated inflammatory disease associated with psoriasis which includes peripheral arthritis, enthesitis, dactylitis, and spondylitis manifestations. Ixekizumab, under investigation for PsA treatment, is an IgG4 monoclonal antibody that binds with high affinity and specificity to the proinflammatory cytokine IL-17A.
Methods: In a phase 3 trial, 417 biologic disease-modifying antirheumatic drug (bDMARD)-naive patients with active PsA were randomized to up to 24 weeks of placebo (N=106); adalimumab 40 mg (N=101) once every 2 weeks (Q2W; active control); or ixekizumab 80 mg Q2W (N=103) or Q4W (N=107) following 160 mg initial dose at Week 0. Endpoints included American College of Rheumatology 20 response (ACR20) at Week 24 (primary), ACR50, ACR70, a 75/90/100% improvement in Psoriasis Area and Severity Index (PASI 75/PASI 90/PASI 100), Disease Activity Score (28 joint count) based on C-reactive protein (DAS28-CRP), Leeds Dactylitis Index (LDI-B) and Enthesitis Index (LEI), Health Assessment Questionnaire – Disability Index (HAQ-DI), and Van der Heijde modified Total Sharp (mTSS) score at 12 and 24 weeks. Efficacy variables were evaluated using the intent-to-treat population. Continuous data were evaluated using mixed-effects model for repeated measures. Categorical

data were compared using a logistic regression model with missing values imputed by non-responder imputation, which treats inadequate responders as non-responders.
Results: 382 patients completed 24 weeks of the study. A significantly greater percentage of patients treated with ixekizumab 80 mg Q2W or Q4W achieved ACR20, ACR50, ACR70 and PASI 75/90/100 responses than with placebo at 12 and 24 weeks ($p<.01$). Both ixekizumab groups experienced significantly greater reductions than placebo for measures of dactylitis (LDI-B) at 12 and 24 weeks but not for enthesitis (LEI). Disease activity (DAS28-CRP) and functional disability (HAQ-DI) improved and inhibition of radiographic progression of joint structural damage (mTSS) was demonstrated with both ixekizumab doses compared to placebo ($p<.025$). Efficacy results with adalimumab versus placebo were significant on most measures, thus validating the study design. At 24 weeks, the incidence of treatment-emergent adverse events (TEAE) was greater ($p<.05$) and the rate of serious adverse events was higher ($p>.27$) with ixekizumab and adalimumab compared to placebo. Discontinuation due to a TEAE was similar across groups. No deaths occurred.
Conclusion: In bDMARD-naive patients with active PsA, ixekizumab showed significant, clinically meaningful improvements of disease activity and physical function, reduction in dactylitis, greater skin clearance of plaque psoriasis, and inhibition of structural progression. Ixekizumab was well tolerated with no unexpected safety findings.

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Metabolic Syndrome in Systemic Lupus Erythematosus and its Associated Factors: A Cross-Sectional Analysis

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Objectives: Background: Systemic lupus erythematosus (SLE) is chronic autoimmune inflammatory disease, usually affecting women in their reproductive period. SLE is associated with increased risk of premature cardiovascular diseases (CVD), and accelerated atherosclerosis which contribute to early morbidity and mortality in these patients. These comorbidities may be driven by specific disease factors or medications exposure. Metabolic syndrome (MetS) is characterized by presence of risk factors, including hypertension, hyperglycemia, dyslipidemia, and abdominal obesity and has been associated with increased cardiovascular risk. The identification of MetS can be simple and inexpensive signal of increased CVD risk in SLE patients. An association between MetS and high serum uric acid (UA) has been reported, so hyperuricemia may play a role in MetS, and CVD. Objectives: The aim of the study was to determine the frequency of MetS in SLE patients. Also, to investigate the differences in patients' or disease factors in SLE with or without MetS.
Methods: A total 90 SLE patients who met at least four revised ACR classification criteria for SLE were recruited in this cross-sectional study. Patients were evaluated for demographic, anthropometric, clinical features, laboratory data and treatment modalities at the time of the study. BMI were calculated and obesity was defined as BMI more than 30 kg/m2. Current disease activity was assessed using SLE Disease Activity Index (SLEDAI-2K). Presence of MetS was defined according to the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III). Patient was considered as having MetS when met 3 or more of the definition criteria.
Results: SLE patients were divided into two groups, with and without MetS, 42.4% of our SLE patients met the definition for MetS. Patients with SLE and MetS had significantly increased age,

delayed age at diagnosis, and higher BMI ($p<0.00$). Significant differences were noted in all MetS components included in the definition between patients with and without MetS ($p\leq 0.00$). There was positive association between MetS and total SLEDAI-2K and renal SLEDAI score ($p< 0.01$). MetS was strongly associated with the presence of high level of UA and serum creatinine ($p<0.00$). When evaluating treatment received at the time of recruitment, no differences were found between SLE patients with and without MetS.
Conclusion: Metabolic syndrome is prevalent among SLE patients. Metabolic syndrome is associated with disease activity, nephritis, obesity and hyperuricemia in these patients. Identification and treatment of MetS components can decrease cardiovascular morbidity and mortality and therefore improving the prognosis of SLE.

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Predictors of Organ Damage Progression and Impact on Health-Related Quality of Life in Systemic Lupus Erythematosus

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Objectives: To describe cumulative organ damage in a longitudinal cohort of SLE patients and to evaluate the impact of key disease-related factors, medical therapies, demographic variables, and serological biomarkers on the rate of damage accrual. The relationship between cumulative organ damage and health-related quality of life (HRQoL) was also examined.
Methods: A longitudinal database of SLE patients followed for up to 14 years was analyzed. Patients were assessed at enrollment and annually for (i) cumulative organ damage (Systemic Lupus International Collaborating Clinics (SLICC)/ACR Damage Index (SDI)) and (ii) HRQoL (Medical Outcome Survey Short Form-36 (SF-36) subscales and summary scores). The impact of demographic, disease-related and treatment-related factors on damage progression was examined using multivariable Cox proportional-hazards models. The impact of changes in SDI scores on HRQoL was assessed using linear mixed-effects modeling.
Results: There were 273 SLE patients with a mean (SD) follow-up of 7.3 (4.3) years. Seventy-seven patients (28.2%) had preexisting damage (baseline SDI>0) and during follow-up, 126 (46.1%) had an increase in SDI scores. Multivariate analysis revealed that older age, ≥8 ACR classification criteria, immunosuppressive drugs, cigarette smoking, and higher C-reactive protein (CRP) levels up to time of first SDI change were associated with an earlier increase in SDI scores. Changes in SDI scores were associated with initial declines in SF-36 scores at the time that damage occurred, with subsequent change in HRQoL comparable to that seen in patients without damage progression.
Conclusion: Pre-existing organ damage and other risk factors, some modifiable, predict additional damage accrual in SLE patients. The negative impact of damage progression on HRQoL emphasizes the need to target modifiable risk factors and develop effective prevention and treatment strategies to reduce organ damage over time.

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A Longitudinal Analysis of Change in Lupus Nephritis in an International Inception Cohort using a Multistate Markov Model Approach

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Objectives: Patients with lupus nephritis (LN) may have improvement or deterioration in renal

status over time. To capture bidirectional change we used a reversible multistate Markov model to study transitions in glomerular filtration rate (GFR) and proteinuria (PrU) in a prospective, international, inception cohort of SLE patients receiving standard of care.
Methods: Patients were evaluated at enrolment and annually. GFR states were defined: state 1 (eGFR:>60 ml/min); state 2 (eGFR:30–60 mL/min); and state 3 (eGFR:<30 ml/min). Similarly, PrU states were defined: state 1 (ePrU:<0.25 gr/day); state 2 (ePrU:0.25–3.0 gr/day); and state 3 (ePrU:>3.0 gr/day). Multistate models provided estimates of relative transition rates and state occupancy probabilities.
Results: Of 1,826 SLE patients, 89% were female, 49.2% Caucasian with mean±SD age 35.1±13.3 years. The mean disease duration at enrollment was 0.5±0.3 years and follow-up was 4.6±3.4 years. LN occurred in 700/1,826 (38.3%) patients. The likelihood of improvement in eGFR and ePrU (states 2→1 and 3→ 2) was greater than deterioration (states 1→2 and 2→3). After 5 years, the estimated transition to ESRD was 62% of patients initially in eGFR state 3 but only 11% from ePrU state 3. The probability of remaining in initial eGFR states 1, 2 and 3 was 85%, 11%, 3% and for ePrU was 62%, 29%, 4%. Male sex (p=0.04) predicted improvement in eGFR states and older age (p<0.001), race/ethnicity (p<0.001), higher ePrU state (p<0.001), higher renal biopsy chronicity score (p=0.013) and baseline anticardiolipin antibodies (p=0.039) predicted deterioration. For ePrU, race/ethnicity (p=0.009), higher eGFR state (p=0.011) and higher renal biopsy chronicity score (p=0.015) predicted deterioration. Positive lupus anticoagulant (p=0.006) and ISN/RPN class V nephritis (p=0.013) were associated with lower improvement rates.
Conclusion: Multistate modeling in patients with LN generates probability estimates of transitions between disease states that reflect improvement or deterioration in renal outcomes. This approach identifies predictors of change in renal status and can inform clinical trial design by identifying outcomes that new therapeutic interventions for LN should meet or exceed.

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Development and Testing of an On-line Technology Tool to Facilitate Tracking of Data and Analyzing Outcomes in Inflammatory Arthritis across Multiple Practices

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Objectives: Rheumatologist surveys† have shown that accessibility and consistency of patient clinical data to be widely fragmented and underutilized. Access to patient data may assist physicians to provide optimum patient care and to support treatment decisions. Our objectives were to develop and test a universal rheumatology tool that would facilitate tracking patient information and provide rheumatologists access to a multi-practice database with capacity to perform longitudinal analysis of patient outcomes. † Surveys commissioned by Afirma Health Solutions Inc., information available upon request.
Methods: The inflammatory arthritis (IA) Pathways technology platform was developed with the intent of providing rheumatologists with a tool to efficiently and securely populate patient history. IA Pathways platform was built using a secure online portal to allow data entry and retrieval from mobile applications. Testing was done on data obtained by retrospective chart reviews of patients from three community rheumatology clinics. Following informed consent, data captured included: age, gender, diagnosis, disease duration, medications, comorbidities, serological markers of inflammation, joint counts, radiographic evidence of erosions and Health Assessment Questionnaires. All data was entered into the IA Pathways platform. Confidentiality of data was preserved through placement of the subjects' identifiable

information in a patient relationship management (PRM) database. This method allows future sharing of anonymized data among participating rheumatologists for outcome analysis.
Results: To date, 185 IA patients have been enrolled in the IA Pathways Registry: 78.4% with rheumatoid arthritis, 12.0% with psoriatic arthritis and, 9.2 % with ankylosing spondylitis. Follow up time averaged 10.6±5.8 years, ranging 1.0 to 31.0 years. The IA technology platform successfully processed the entered data to display the results in graphic format providing an overview of medication use and disease activity over time "at a glance" for individual or groups of patients was preserved through placement of the subjects' identifiable information in a patient relationship management (PRM) database. This method allows future sharing of anonymized data among participating rheumatologists for outcome analysis.
Conclusion: The accessibility to electronic data in the form of predetermined reports or raw data provides the physician the capability to review individual patient outcomes or specified cohorts on a real-time basis. It has been determined that a standardization of collectible information would benefit rheumatologists and patients. This will encourage the use of a universal technology tool that will provide consistent collected data for comparative analysis.

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Comparison of Dose Escalation and Co-therapy Intensification between Patients with Rheumatoid Arthritis Initiating Biologic Treatment with Etanercept, Adalimumab and Infliximab

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Objectives: The Canadian Drug Utilization in Rheumatoid Arthritis (CADURA) study compared dose escalation, intensification of DMARDS and steroids, and switches to another biologic between patients with rheumatoid arthritis (RA) initiating etanercept (ETA), adalimumab (ADA) or infliximab (INF).
Methods: This was a retrospective chart review of RA patients treated in 11 clinical practices across Canada. Patients were 18 years or older who initiated an anti-TNF between January 1, 2006 and December 31, 2012, with no prior use of biologic DMARD. Outcomes were assessed over 12 and 18 months. For the 12-month analysis, patients were required to have ≥3 physician visits following initiation and ≥1 visit during months 9-15; the 18-month analysis also required ≥ 1 visit during months 15-21. Dose-escalation of anti-TNF was defined as the first occurrence of any upward adjustment in dose or dosing frequency of the anti-TNF from the label indication: ETA, 25 mg twice weekly or 50 mg once weekly; ADA, 40 mg once every other week; INF, 3 mg/kg every 8 weeks after the 3rd infusion. Additional outcomes were: 1) anti-TNF dose-escalation and/or DMARD intensification and 2) anti-TNF dose-escalation and/or DMARD and/or steroid intensification. Intensification included any increase in dose or dosing frequency, any addition, any switch from oral to subcutaneous injection (DMARD), or any intramuscular or intra-articular injections (steroid) 3 months after initiation of the anti-TNF.
Results: The 12-month analysis included 314 patients (mean age 56.3 years); 77% female; mean RA duration 9.0 years. Among patients initiating ADA, 83% had concomitant DMARD vs 72% of patients initiating ETA and 75% initiating INF. There were 217 patients in the 18-month analysis. No dose escalation occurred with ETN over 12 and 18 months, vs 38% and 32% for INF ($p<0.001$) and 2% and 2% for ADA ($p=0.199$, $p=0.218$). Over 18 months, dose escalation

and/or DMARD and/or steroid intensification was less frequent among ETA (16%) vs INF (44%, p=0.005) and ADA (34%, p=0.004). By 18 months, 22% of patients initiating ADA had switched to another biologic compared with 6% of ETN patients (p=0.001).
Conclusion: Physicians more frequently used dose escalation when treating with INF, and DMARD and/or steroid intensification when treating with ADA. Patients treated with ETN had no dose escalation, were less likely to have DMARD and/or steroid intensification than patients initiating INF or ADA over 12 and 18 month, and were less likely to switch to another biologic over 18 months than patients initiating ADA.

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Rheumatoid Arthritis Disease Trackers to Support Treat to Target Strategies: A Needs Assessment Survey

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Objectives: Custom-built software applications (apps) have become an integral part of medical practice today to help physicians be more efficient. They are being widely used for diagnostic purposes and for monitoring chronic conditions. In rheumatology, medical apps may help health professionals track disease activity and aid treatment decision in real-time to achieve optimal patient outcomes. The objective was to assess the need of a digital disease tracker to monitor disease activity in rheumatoid arthritis (RA) patients and psoriatic arthritis (PsA).
Methods: A needs assessment survey of Canadian rheumatologists was conducted in the spring of 2015. Our goals were to understand their views about treat to target strategies, and their perceptions of digital trackers to provide benefit to their patients and practice.
Results: Of 410 surveys sent via Survey Monkey, we received 70 responses (17% response rate). Of these 70, 67% had practiced for 15 to 20 years and the majority (77%) were from either Ontario or Quebec serving predominantly urban patient populations (85.71%). The majority of respondents (55.71%) utilize both paper and electronic medical records (EMR). However, of the 87.14% who use electronic medical records (EMR) all respondents accessed EMR via desktop/laptop computer with only 15.71% also utilizing tablets or smart phones. Clinical practice guidelines were widely used (87%) to make treatment decisions. CRA guidelines were mostly commonly selected, followed by ACR then EULAR. Treat to target strategies were employed by 92.86% of respondents, with swollen joint count (85.94%), physician global assessment (69.35%) and patient global assessment (57.14%) being the most common targets while DAS28 (45.45%) and SDAI (42%) were used less frequently . Over 80% of respondents do not use an RA disease tracking tool at this time. However 54.29% of respondents were very interested in having access to an efficient, user-friendly electronic device or app to help assess RA patients' disease activity at each visit, and track it over time. Many strongly believed such an app would benefit their practice (48.57%) and their patients (44.93%) and felt it was very important that the tracker be integrated with EMR (62.86%). Similar to accessing EMRs most respondents selected desktop/laptop as their preferred device for use of a digital RA Tracker.
Conclusion: Our survey found that most Rheumatologist apply treat to target strategies but are not currently using an RA disease tracking tools in their practice. A digital RA disease assessment tracker may be of value to Rheumatologists in Canada.

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Development of an SI Joint CT Screening Tool for the Identification of Axial Spondylitis

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Objectives: Many AS patients, particularly those with inflammatory bowel disease (IBD), may have CT scans performed for other clinical indications and sacroiliitis may be incidentally noted. Though the modified New York (mNY) criteria have never been validated in CT imaging, previous studies have used a radiologist's adaptation of the criteria as a gold standard for diagnosing sacroiliitis. Previous studies have suggested this is not appropriate given the increased sensitivity of CT. Our objective is to develop a validated screening tool for the identification of sacroiliitis on CT.
Methods: Patients from the Toronto AS clinic meeting mNY criteria for AS who had CT scans of the abdomen/pelvis were matched 1:1 to controls by age and gender. Control patients had their charts reviewed to ensure they had no history of spondylitis, colitis, uveitis, or psoriasis. A training exercise involving 12 CT scans was conducted to identify the most feasible and reproducible method of detecting erosions, sclerosis, and ankylosis. A derivation cohort of 24 CT scans (12 AS, 12 control) was used to test these features. Two blinded readers performed a validation study on 68 CT scans (34 AS, 34 control). Inter- and intra-observer values, sensitivity, specificity, and likelihood ratios (LR) were calculated for each variable as well as combinations of variables.
Results: Counting the maximum number of erosions seen on 1 slice for each of the 4 articular surfaces (total erosion score) was not inferior to counting the number of erosions seen on every slice in either transverse or coronal views. A total erosion score of ≥3 had the highest sensitivity and specificity for AS. Within the derivation cohort, the presence of ankylosis or a total erosion score of ≥3 had a sensitivity and specificity of 100%. Features with the highest +LR included ankylosis, number of erosions, iliac sclerosis >0.5cm, and sacral sclerosis >0.3cm. Inter-reader reliability for these variables were 1.0 for ankylosis, 0.99 for number of iliac erosions, 0.99 for number of sacral erosions, 0.58 for iliac sclerosis, and 0.39 for sacral sclerosis. Within the validation cohort, the presence of >1cm of ankylosis or a total erosion score of ≥3 resulted in a sensitivity of 91% and specificity of 91%. The addition of >0.5cm of iliac sclerosis or >0.3cm of sacral sclerosis marginally increased the sensitivity to 94% but decreased specificity to 85%.
Conclusion: It is proposed that the presence of ankylosis >1cm or ≥3 total erosions has an optimal sensitivity and specificity for AS.

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Acute Anterior Uveitis in Ankylosing Spondylitis: Association with Inflammatory Bowel Di sease and Psoriasis Independent of HLA B27

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Objectives: Acute anterior uveitis (AAU) is the most common extra-articular manifestation in patients with ankylosing spondylitis (AS), developing in 20-30% of these patients during the course of their disease. Our aim was to study the characteristics and risk factors associated with AAU in our cohort of AS patients.
Methods: From our longitudinal observational cohort, 716 patients with AS (meeting modified New York Criteria) and at least 2 years follow up were included and who were followed from January 2006 to November 2013. Patients with (AAU+) and without (AAU-) uveitis were

compared. T-test, Chi-squared tests and logistic regression were used where appropriate.
Results: Of the 716 patients, 225 (31.4%) had a reported diagnosis of AAU at their baseline clinic visit. Patients with AAU+ were older compared to the AAU- group (mean age of 42.6 vs 37.9 years; p< 0.001). AAU started after onset of back pain in the majority of patients with only 10.5% of patients reporting onset of AAU before onset of AS related back pain. Patients with AAU had higher HLA-B27 (B27) prevalence (91.8% vs 82.1%, p<0.05). In the multivariate analysis (MVA), AAU was independently associated with age, B27, psoriasis, IBD and elevated CRP. B27 (OR=2.66 [95% CI=1.44-4.9]), psoriasis (OR=2.36 [95% CI=1.41-3.97]) and IBD (OR=2.25 [95% CI=1.27-4]) are the strongest independent predictors of AAU. Within the AS/IBD group (n=86), 43% of these patients had a history of AAU, of which 81% were B27 positive. In patients with AAU , there was a trend towards more peripheral arthritis/enthesitis. The BASMI score was higher in patients with AAU (3.3 vs 2.7, P<0.05), however there was no association found on MVA. No significant difference was found between the two groups in terms of BASDAI score, hypertension, diabetes, previous history of myocardial infarctions and smoking. There was no difference found between NSAID use at baseline (66.1% vs. 66.5%, p=0.90). Patients with AAU were more frequently treated with DMARDs (26% vs. 16.5%, p<0.01). Sulfasalazine was used more frequently in the AAU+ group (14.2% vs. 7.9%, p<0.01). Use of biologics was similar at baseline (22.2% vs. 18.4%, p=0.23).
Conclusion: In our cohort of AS patients, an increased frequency of HLA-B27 was seen in AAU+ AS. AAU+ AS is associated with psoriasis and IBD. The psoriasis and IBD association is independent of HLA-B27, suggesting an interaction of other genetic as well as environmental factors. At baseline DMARD use was associated with AAU, likely reflecting the association with peripheral joint disease.

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Prevalence of Sacroiliitis in Inflammatory Bowel Disease Using a Standardized CT Screening Tool

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Objectives: Previous studies assessing the prevalence of sacroiliitis in patients with inflammatory bowel disease (IBD) using CT scans have relied on a radiologist's gestalt. These estimates have ranged between 30-45%; however, only a small proportion of these patients were symptomatic and only patients who had symptoms suggestive of spondylitis had an increased frequency of HLA-B27. To date, the prevalence of sacroiliitis in IBD patients using a validated CT screening tool is not known. Our aim is to determine the prevalence of sacroiliitis in patients with IBD using a validated standardized CT screening tool and to compare this prevalence to that in a non-IBD control population.
Methods: 306 IBD were recruited from one gastroenterology clinic and 108 control patients were recruited from a urology clinic. The chart of each control patient was reviewed to ensure there was no history suggestive of spondyloarthritis. We utilized a CT scan screening tool that had been previously developed and validated to have a sensitivity of 91% and a specificity of 91% for the identification of sacroiliitis. Two readers blinded to each patient's clinical information scored the CT scans as positive if there was >1cm of ankylosis or ≥3 total erosion score. The presence of lumbar spine syndesmophytes and radiologists comments of the SI joints were noted.

Results: There was no significant difference in prevalence of sacroiliitis between patients with Crohn's disease (CD) and Ulcerative colitis (UC) (Chi2 test= 0.725). The prevalence of sacroiliitis amongst control, CD, and UC patients were 5.6%, 15.0%, and 16.9% respectively. Amongst the 49 CT scan positive patients, the radiologist commented on 39 images and described 59% as having normal SI joints. 9/49 patients had lumbar syndesmophytes. 21/49 patients were able to be contacted and 14% had a previous diagnosis of spondyloarthritis. Amongst the 267 CT scan negative patients, radiologists commented on 184 images and noted 5 definite and 4 possible cases of sacroiliitis.
Conclusion: We report that the prevalence of sacroiliitis in IBD patients is 16% with no difference between CD and UC patients. There was a major discordance between the use of a validated CT screening tool and radiologist's gestalt for the identification of sacroiliitis. Despite the awareness of the strong relationship between IBD and spondyloarthritis, a significant proportion of patients are missed. Finally, there may be a small proportion of asymptomatic patients who have changes in their sacroiliac joints suggestive of sacroiliitis, though this is of uncertain clinical significance.

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Twitter and Rheumatology: Significant and Incremental Growth in Usage

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Objectives: The continued growth of social media has allowed people to rapidly communicate, share, and develop ideas and information. Twitter is an online social networking service which allows users to submit and to read short 140 character messages called "tweets". Since its creation in 2006, its user base has continued to grow with an estimated current active user base of half a billion people. Sixty million tweets are estimated to be generated each day. Twitter can be a valuable portal to educate patients, share research ideas and findings and increase awareness of important health related issues. With regards to Rheumatology, there is lack of knowledge in terms of its online twitter presence and its development over the years. The aim of this study is to highlight the use of Twitter in relation to Rheumatology. To the best of our knowledge, no previous research has examined this area before.
Methods: The Symplur® healthcare analytics website was used to retrospectively examine traffic related to chosen Rheumatology associated hashtags. Symplur® was used to generate statistics for the number of impressions, unique tweets (excluding retweets) and number of participants. Some of the hashtags chosen include: #Rheum, #Lupus, #Fibro, #Arthritis, #Osteoporosis, #Spondylitis (AS), #RheumatoidArthritis, and #Vasculitis. #Diabetes, #IBD (Inflammatory Bowel Disease), and #Psoriasis were also chosen as comparators. Statistics were obtained from a 5 year period (2010 to 2014).
Results: The total number of Rheumatology related tweets related to the major hashtags grew from only 319 tweets in 2010 to 497,595 tweets in 2014. The #Lupus hashtag showed the most activity, followed by #Fibro (fibromyalgia), #Arthritis and #Rheum. Between the years 2013 and 2014, there was an average growth in number of total tweets by 37%. When comparing #Diabetes with Rheumatology related hashtags in 2014, there were a total of 1,037,211 tweets related to #Diabetes vs 538,186 tweets related to #Rheum hashtags. In terms of number of contributors, in 2014, there were a total of 135,237 participants using Rheumatology related hashtags. When looking at influence, the top 10 contributors tweeting in the #lupus, #RheumatoidArthritis and #Spondylitis hashtags contributed 12.6 %, 11% and 61.4% of total

number of tweets respectively
Conclusion: Twitter usage in relation to Rheumatology has shown a dramatic growth over the last 5 years and continues to show sustained growth. These novel findings suggest this social media portal has the potential to be a valuable tool in informing and shaping Rheumatology related healthcare.

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Internal Medicine Resident Knowledge and Perceptions about Rheumatology – Results from the MSQuébec Workshop

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Objectives: MSQuébec is an annual workshop offered by the Association des Médecins Rhumatologues du Québec to PGY1 and PGY2 internal medicine residents for over 10 years. The aim is to introduce rheumatology to residents early in their training by teaching musculoskeletal exam and introduction to rheumatology in a highly motivating setting. The program consists of 8 level-one (4 physical exam [shoulder, knee, hand, spine], musculoskeletal ultrasound, videocapillaroscopy, lab testing and approach to arthritis) and 6 level-two (osteoporosis, spondyloarthropathies, connective tissue diseases, vasculitis, advanced therapeutics, joint injection techniques) workshops for first and second time participants, respectively. Since its inception, the workshop has run at full capacity and the majority of fellows recruited in the Quebec rheumatology training programs are graduates of the workshop. While these provide some measures of effectiveness, the objective of the current study was to measure the impact of the workshop on resident knowledge and perceptions.
Methods: A survey was developed by the faculty to test resident knowledge of and perceptions to rheumatology. The survey was administered a first time (pre-test) at the time of registration for the workshop and a second time (post-test) in the 2 weeks following the completion of the workshop. Fourteen knowledge questions were scored as right or wrong and 9 perception questions were scored using a 5-point Likert scale (ranging from 1 [poor] to 5 [excellent]). Pre- and post-test results were compared using paired t-tests and Wilcoxon signed-rank test.
Results: The responses from 50 residents (38 level-one and 12 level-two) participating in the 2015 workshop were analyzed. The post-test score was significantly better than the pre-test score (11.4±1.7 (81%) vs 9.2±2.3 (66%); mean difference 2.2, 95% CI, 1.4 to 3.1, $p < 0.001$). Pre-test scores of level-two compared to level-one residents were significantly better as well (10.6±1.2 vs 8.8±2.1, mean difference 1.9, 95% CI, 0.8 to 2.9, $p < 0.001$). There was significant improvement in how residents perceived their skills (e.g. post vs pre-test ratings for hand exam 3.4 vs 2.2, $p < 0.001$, lab testing 3.2 vs 1.9, $p < 0.001$, differential diagnosis 3.2 vs 2.3, $p < 0.001$).
Conclusion: The MSQuébec annual rheumatology workshop is associated with significant improvement in internal medicine residents' knowledge and perceptions in key rheumatology topics, with potential long-term benefits indicated by higher pre-test scores for second time participants. This workshop can be used to inform efforts underway in other provinces to develop rheumatology training for internal medicine residents.

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The Validity and Reliability of Online Obituaries as a Source of Mortality Data

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Objectives: Loss to follow-up is a major threat to the conduct of chronic disease cohort research. Tracking the survival status of patients who are lost to follow-up is limited by restricted access to death certificate data and patients moving. One strategy to gather mortality data is to use online obituaries. Although commonly used clinically, it is uncertain if this is appropriate for research. The primary objective of this study was to evaluate the validity and reliability of online obituaries as a source of mortality data in 2 chronic diseases, systemic sclerosis (SSc) and idiopathic pulmonary arterial hypertension (IPAH).
Methods: Patients whose survival status was known were randomly selected from the Toronto Scleroderma Program and the University Health Network Pulmonary Hypertension Program. Five commonly used online obituaries were evaluated. Two investigators, blinded to survival status, independently entered the first and last name of each patient in each website. If the patient was identified as deceased, other matching variables (date of birth, postal code, disease) were used to verify the patient. Pearson's correlation coefficient (r) was used to evaluate the correlation between the website finding and actual survival status. Intra-rater and inter-rater reliability was evaluated using the intra-class correlation coefficient (ICC).
Results: We studied 365 patients (273 females, 92 males) including 219 SSc (171 females, 48 males) and 146 IPAH (102 females, 44 males) patients. There was a significant positive correlation between website 1 and the actual survival status (r = 0.36 (95%CI 0.27, 0.45, p<0.001)) and was similar across diseases, SSc (r=0.34 (95%CI 0.21, 0.45, p<0.001) and IPAH (r=0.41 (95% CI 0.26, 0.53, p<0.001). The ICC for the intra-rater reliability of websites 1 and 3 were 0.95 (95%CI 0.93, 0.96) and 0.96 (95%CI 0.95, 0.97) respectively, which were higher compared website 2, 4, 5 (0.77 (95%CI 0.72, 0.80), 0.75 (95%CI 0.71, 0.80) and 0.21 (95%CI 0.11, 0.31) respectively). The ICC for inter-rater reliability was strong (0.82 (95%CI 0.78, 0.85).
Conclusion: Use of selected online obituaries is a valid and reliable method to gather mortality data. They could be used in clinical research to track patients who are lost to follow up.
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What is the Location of Enthesitis in Ankylosing Spondylitis and Psoriatic Arthritis Patients and How Do They Respond to Anti-TNF Treatment?

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Objectives: To identify the location of enthesitis in ankylosing spondylitis (AS) and psoriatic arthritis (PsA) patients and to determine their response to anti-TNF treatment.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, AS, or PsA with infliximab (IFX) or golimumab (GLM). Eligible people for this analysis included AS and PsA patients treated with IFX who were enrolled since 2005 or with GLM enrolled since 2010 who had available information on enthesitis. The paired sampled t-test was used to compare the enthesitis count at baseline and 12 months.

Results: A total of 260 AS patients and 261 PsA patients were enrolled with a mean (SD) age at baseline of 46.1 (13.0) vs. 50.0 (12.0) years, respectively, and disease duration of 6.4 (9.8) vs. 5.2 (6.8) years. Among patients with AS, 28.1%, 21.7%, 22.4% had enthesitis at baseline, 6 months and 12 months, respectively. For PsA these numbers were 32.2%, 19.7%, and 22.6%, respectively. The presence of enthesitis by anatomical site included higher proportions observed for the greater trochanter (GT) in AS patients (14.2%) and the lateral epicondyle humerus (LEH) in PsA patients (16.1%). Among AS patients, enthesitis was also present at the supraspinatus insertion (SI;11.5%), lateral epicondyle humerus (LEH; 10.8%), proximal achilles (PA;10.8%), medial epicondyle humerus (MEH;8.1%), insertion plantar fascia (IPF;7.7%), quadriceps insertion patella (QIP;6.9%), and inferior pole patella or tibial tubercle (PATT;6.9%). Among PsA patients, enthesitis also was present at the PATT (13.8%), PA (13.0%), MEH (12.6%), IPF (11.9%), GT (10.7%), SI (10.7%), and QIP (9.6%). Presence of enthesitis in all anatomical sites was significantly associated with higher HAQ among AS and PsA patients. The mean (SD) enthesitis count at baseline and 12 months was 4.4 (3.4) vs. 2.6 (2.3) (P=0.061) among AS patients and 5.0 (3.8) vs. 3.8 (3.0) (P=0.006) in PsA patients, respectively.
Conclusion: A considerable proportion of PsA and AS patients had enthesitis at anti-TNF initiation in this Canadian real-world cohort. Overall, presence of enthesitis was associated with significantly higher functional disability. Treatment with IFX or GLM for 12 months was associated with significant reduction in the mean enthesitis count.

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Effectiveness and Safety of Golimumab in the Treatment of Rheumatoid Arthritis over a 24 Month Period

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Objectives: Although the efficacy and tolerability of golimumab (GLM) in patients with rheumatoid arthritis (RA) has been demonstrated in several controlled clinical trials, it is essential to assess the real-life effectiveness of therapeutic interventions and demonstrate true population-based benefits. The aim of this analysis was to describe the real-life effectiveness of golimumab in RA patients in a Canadian routine clinical practice setting.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, ankylosing spondylitis, or PsA with infliximab or GLM. Eligible participants for this analysis included RA patients treated with GLM enrolled since 2010. Descriptive statistics were produced for clinical outcome measures and patient reported outcomes at baseline and 6, 12, and 24 months of treatment. Within-group changes were assessed for statistical significance with the paired-samples Student's t-test. Safety was assessed with the incidence of adverse events/100 patient-years.
Results: A total of 318 RA patients were included in this analysis. The majority were female (72.4%), the mean (SD) age was 57.3 (13.5) years and disease duration since diagnosis was 8.0 (8.6) years. At baseline, the proportion of patients taking concomitant DMARDS, NSAIDS and

corticosteroids were, 65.1%, 26.7%, and 18.9%, respectively. 92.8% of patients were biologic naïve. Six-month, 12-month, and 24-month follow-up was available for 236 (74.2%), 171 (53.8%), and 79 (24.8%) patients, respectively. After 6 months of treatment, statistically significant (P<0.001) and clinically meaningful improvements were observed for all disease parameters and were sustained over 24 months of treatment (P<0.001). The proportion of patients who achieved DAS28 remission at 6, 12, and 24 months was 33.0%, 38.8%, and 42.6%, respectively; SDAI remission was 16.7%, 30.6%, and 33.9%; and CDAI remission was 14.6%, 21.2%, and 25.0%, respectively. A total of 419 AEs (150.3 events/100 patient-years) were reported by 150 (47.2%) patients and 50 (17.9 events/100 patient-years) serious AEs (SAEs) by 39 (12.3%) patients. The incidence of infections and malignancies were 9 (3.2 events/100 patient-years and 4 (1.4 events/100 patient-years SAEs, respectively. Three deaths were reported during the course of the study (lung adenocarcinoma metastatic, cardiac disorder, and cerebrovascular accident), of which the latter was judged by the treating physician as possibly related to golimumab.

Conclusion: The results of this Canadian longitudinal observational study have shown that GLM is well tolerated and effective in reducing symptom severity and improving disease outcomes in RA patients over a 2 year period.

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Minimal Disease Activity among Psoriatic Arthritis Patients in Canada: Which Unmet Criteria are more Prevalent among Responders?

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Objectives: Minimal disease activity (MDA) is now considered an objective target which is more attainable in psoriatic arthritis (PsA) compared to remission (DAS28 <2.6) which is more difficult to achieve and maintain. The criteria for MDA encompass different aspects of this distinct and heterogeneous disease. The aim of this analysis was to assess which unmet criteria were more common among patients who achieved MDA based on patient reported outcomes (PROs) in a real-world, routine clinical care setting in Canada.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis (RA), ankylosing spondylitis (AS), or psoriatic arthritis (PsA) with infliximab (IFX) or golimumab (GLM). Eligible patients for this analysis included PsA patients treated with IFX or GLM between 2005 and 2015. MDA was defined as the fulfillment of ≥5 of the following criteria: TJC28≤1, SJC28≤1, PASI≤1, pain (VAS) ≤15 mm, PtGA (VAS) ≤20 mm, HAQ≤0.5, tender entheseal points ≤1.

Results: A total of 223 PsA patients (51.4% male) were included with a mean (SD) age of 49.8 (11.1) years and disease duration since diagnosis of 5.4 (6.3) years. MDA was achieved by 11.7%, 43.5%, and 44.8% at baseline, 6 months and 12 months of treatment, respectively. The most commonly unmet MDA criteria in patients who achieved 5/7 criteria was patient-reported pain (69.2%), PtGA (48.7%), and HAQ (20.5%). The mean (SD) for these disease parameters

were 31.8 (13.5) mm for pain, 39.3 (10.9) mm for PtGA and 0.95 (0.46) for HAQ. Furthermore, in these patients the most prevalent combination in unmet criteria was pain+PtGA with 38.5% followed by PASI+pain with 12.8%. In patients who achieved 6/7 MDA criteria, the most commonly unmet criteria included PASI with 21.9%, pain with 18.8% and HAQ with 18.8%. The mean (SD) for these disease parameters were 3.7 (2.1) for PASI, 22.8 (7.9) mm for pain and 0.75 (0.08) for HAQ.
Conclusion: The current analysis has shown that by 6 months of treatment almost 50% of patients achieved MDA. Among patients who achieved 5/7 criteria the most commonly unmet criteria in patients who achieved MDA are PROs including pain, PtGA and HAQ-DI. These results highlight the difference in the perception of disease activity by physicians and patients and in the relative importance placed on specific disease aspects.

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What Proportion of Patients Fail to Achieve CDAI and SDAI Remission based on Physician Global Assessment? An Analysis from a Prospective, Observational Registry

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Objectives: Physician's Global Assessment of Disease Activity (MDGA) is a measure that is frequently incorporated in disease activity indices which reflects the physician's perception of disease activity in rheumatoid arthritis (RA). The aim of this analysis was to assess the proportion of patients failing to achieve CDAI and SDAI remission based on MDGA in a real-world, routine clinical care setting in Canada.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment with infliximab (IFX) or golimumab (GLM). Eligible patients for this analysis included RA patients treated with IFX or GLM between 2005 and 2015. Modified versions of CDAI (mCDAI) and SDAI (mSDAI) were calculated by omitting MDGA from the formulas. Correlation of the standard and modified versions of each index was assessed with the Pearson's correlation coefficient. ROC curve analysis was used to identify new thresholds for the modified versions of low disease activity (LDA) and remission. Cross-tabulations with the Chi-square test were used to assess the agreement between the standard and modified definitions of remission and LDA.
Results: A total of 1206 patients were included in the analysis with a mean (SD) age of 56.1 (13.4) years and a disease duration of 8.4 (8.9) years. A strong positive correlation was observed between the standard and modified versions of CDAI ($r=0.99$; $P<0.001$) and SDAI ($r=0.99$; $P<0.001$). Based on ROC analysis the new thresholds for remission and LDA were: CDAI (remission=2.65, LDA=10.05) and SDAI (remission=3.31, LDA=10.73). The proportion of patients achieving remission by both indices was 17.8% and 19.5%, patients not achieving remission by both indices was 75.3% and 74.4%, and patients achieving remission by the new thresholds only was 6.9% and 6.1%, for CDAI and SDAI, respectively. Cross-tabulation of the standard and modified thresholds showed that an additional 8.4% and 7.6% of non-remission cases for CDAI and SDAI, respectively, would be classified as remission with the modified

definitions. Similarly, an additional 17.6% and 15.1% of non-LDA cases for CDAI and SDAI, respectively, would be classified as LDA.
Conclusion: The results of this analysis showed that MDGA could account for up to 8% of non-remission cases and up to 18% of non-LDA cases as measured by CDAI and SDAI. Omission of MDGA from these disease activity indices could have a significant impact on patient management in preventing overtreatment with DMARDs and biologics and avoiding unnecessary switching of DMARDs and biologics.

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Evaluation of Micro-Vascular Digital Blood Flow and Axillary Artery Intimal Medial Thickness in Patients with Scleroderma and Primary Raynaud's Phenomenon using Color Doppler Ultrasound

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Objectives: Systemic Sclerosis (SSc) is a multisystem connective tissue disorder that involves small and possibly larger vessels. We postulated that vascular changes in primary Raynaud's phenomenon (PRP) may predict eventual development of vascular changes in SSc and that SSc subjects will have macrovascular wall thickening.
Methods: Cross-sectional, unblinded, pilot study of 20 female subjects with age range 27-83 years, 17 of 20 on vasoactive medications. Ten met ACR criteria for Scleroderma (SSc), and 10 met criteria for PRP. An additional 10 female subjects served as healthy controls (HC). For digital artery imaging in SSc and PRP patients the more severely affected hand was warmed in a 37 degree C water bath for 5 minutes and then was evaluated within next 5 minutes. For HC subjects the right hand was selected for assessment. Using a Esaote MyLab25 Gold instrument with a 10-18 MHz ultrasound probe for color Doppler the presence or absence of blood flow in the proper palmar digital arteries was identified across 20 flow points in the hand (lateral sides of a digit, proximal and distal to the PIP joint in 5 digits). The presence of normal flow within the digits was tabulated for a total hand score of 20 or less. A subject was considered abnormal if flow was absent in at least 1 of 20 areas. Axillary artery intimal medial thickness (IMT) was measured on the more severely affected extremity. A subject was considered abnormal if IMT was >0.44 mm (95% CI, 0.32-0.40mm, HC).
Results: Small digital vessel loss was abnormal in 1/10 PRP subjects and in 2/10 SSc subjects. Axillary artery wall thickness was increased in 4/10 PRP subjects (IMT 95% CI, 0.36-0.48) and 5/10 SSc subjects (IMT 95% CI, 0.4-0.51). Fisher's Exact Tests showed trends in axillary artery thickness between SSc and HC ($p=0.06$) and between PRP and HC ($p=0.1$). No association was found between IMT and digital score ($p>0.1$); 3/4 PRP and 5/5 SSc subjects with high IMTs had normal digital scores.
Conclusion: Color Doppler flow in hands failed to separate PRP and SSc patients from normal HC. Increases in axillary artery thickness tended to separate SSc from HC and PRP groups, though this study was undersized to detect a meaningful effect. No association was found between vascular blood flow and axillary artery thickness. Perhaps a higher powered study would help further define this association.

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Poor Agreement between Clinical Swelling and Ultrasound-Detected Synovial Thickening in Metatarsophalangeal Joints of Patients with Early Rheumatoid Arthritis

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Objectives: The metatarsophalangeal (MTP) joints of the feet are notoriously difficult to clinically assess in patients with early RA. The study's purpose was to assess the agreement between clinical manifestations of swelling and ultrasound (US) findings of synovial hypertrophy in the MTP joints of patients with newly diagnosed RA.
Methods: Participants were newly diagnosed with RA (DMARD naïve) according to ACR criteria. Clinical assessment of MTP joints 2-5 of both feet were performed by a rheumatologist and the presence of swelling recorded. Each patient also underwent an US examination assessing the synovial thickening of MTPs 2-5 on the same day. US images of each joint were interpreted by a rheumatologist. Synovial thickening was graded on a scale of 0-3 according to OMERACT criteria. Two separate analyses were conducted using different cut-off values on US as the threshold for the agreement with the presence/absence of swelling. For the first analysis (a cut-off of 1), US values of 0 or 1 were considered to have no synovitis while scores 2 and 3 were considered to have synovitis. For a cut-off of 2, a score of 0, 1 and 2 were categorized as absence of synovial thickening while 3 indicated the presence of synovial thickening. Agreement between clinical swelling and synovial thickening of each joint was analyzed using Kappa statistics.
Results: The study included 31 patients (N=26 women, mean (standard deviation) age = 51.0 (11.0) years). Due to the low prevalence of synovial thickening in MTPs 4 and 5, only data from MTP joints 2 and 3 were included. For a cut-off value of 1, synovial thickening and swelling had a poor agreement on MTP 2 (k=0.124) and MTP 3 (k=0.166). Using a cut-off value of 2, a fair agreement was found in MTP 2 (k=0.344) and MTP 3 (k=0.266). Even with a cut-off of 2, there were 7 cases on the MTP 2 joint and 11 on the MTP 3 joint that were missed by the clinical examination but detected on US.
Conclusion: In early RA patients, the agreement between clinical assessment of swollen joints and US-detected synovial thickening was generally very poor. US detected synovial thickening in many more cases than were clinically detected suggesting that US may be effective in assessing/diagnosing early RA. These results justify a larger study to further examine the agreement between US findings and clinical examination in this population.
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Clinical Presentation and Organ Involvement in a Large Sample of Patients with Mixed Connective Tissue Disease who fulfill Alarcón-Segovia's Criteria

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Objectives: To describe the detailed clinical presentation and organ involvement present in a large group of patients who fulfill Alarcón-Segovia's criteria for MCTD
Methods: Design: retrospective cohort study. We identified all MCTD patients attending at our institute from January 1980 until December 2008. Diagnosis of MCTD according to Alarcón-Segovia's criteria and the serologic titer of Anti-RNP abs >1:1.600 were confirmed in all cases. The date of diagnosis was established when the patient met the number of criteria for classification. All patients were followed since diagnosis until the end of follow-up period, lost to follow-up or death, whichever came first. Initial clinical features until diagnosis, organ system involvement, autoantibody profile and comorbidities were retrieved from the medical record.

Results: A total of 98 patients were studied, 91 females and 7 men, female: male ratio of 13:1, patients had a mean (SD) of 35.2(11.6) years old when they met the first criteria and 37.2 (11.4) years at diagnosis. The median duration between appearance of the first clinical manifestation and fulfillment of criteria were 3 years. Mean follow up period was 10 (6.5) years. At disease onset the most common clinical criteria present were: synovitis 51%, Raynaud´s Phenomenon (RP) 49%, and edema in hands 33%. Prevalence of acrosclerosis as initial manifestation was only of 2%. Cumulative symptoms were: RP 97%, synovitis 96%, edema in hands 82%, acrosclerosis 67%, and myositis 47%. Organ system involvement was present as follows: 100% had skin features, 99% musculoskeletal, 72% mucocutaneous, 69% gastrointestinal, 43% pulmonary, 30% hematologic, 21% cardiovascular, 11% renal, and 7% neurologic symptoms. A half of patients were diagnosed into three years from the beginning of the first symptom. Comparing if there was a difference in clinical characteristics in those who met criteria in less than or equal to three years (short period) or more (long period), there was no difference between them, except for Gottron's papules which were more prevalent in those with long period of time until diagnosis p=0.03.
Conclusion: This study shown that half of the patients are diagnosed in the first three years of the beginning of symptoms. The most frequent organ systems involved were: musculoskeletal, mucocutaneous, and gastrointestinal systems.

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Need for Optimization of Immunization Coverage in Rheumatoid Arthritis

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Objectives: Despite the increased risk of infections among rheumatoid arthritis (RA) patients and the availability of national guidelines emphasizing the relevance of immunization in this population; vaccines are underutilized. We assessed vaccination coverage in RA and documented patient-reported barriers for non-vaccination.
Methods: Between May and September 2015, RA patients attending rheumatology clinics at two McGill University Health Centre sites completed an immunization survey on vaccines recommended by the Canadian Rheumatology Association.
Results: 183 RA patients completed the survey, 78% were female, the mean (SD) age was 55 (16.5) years, and the mean disease duration was 8.4 (9.2) years. A hundred and thirty one patients indicated being on treatment: 84% (n=110) on DMARDs, 30.5% (n=40) on biologics and 17.5% (n=23) on oral corticosteroids. Most patients (91.7%, n= 166) were aware of the benefits of influenza immunization and physicians recommended the vaccine to 70.4% (n=117) of them. However, only half of those patients (n=83) to whom immunization was recommended were actually immunized during the 2014-2015 season. Reasons for not receiving the flu vaccine were reported by 32 patients and included: concerns related to the efficacy and adverse effects associated with the vaccine (40.6%, n=13), lack of interest in getting the vaccine (43.7%, n=14), previous side effects (12.5%, n=4) and physician's recommendation against vaccination (3.1%, n=1). Fifty-five patients (30% of those who completed the survey) indicated having received the pneumococcal vaccine within 2.8 (3.1) years prior to the survey; 27.8% (n=51) recalled receiving at least one dose of the hepatitis B (HB) vaccine, and only 3.8% (n=7) of the patients reported having received the zoster (Z) vaccine. Reasons for not receiving the hepatitis B (n=36) and zoster (n=57) vaccines included: lack of recommendation by a physician (HB:38.8%, Z:49.1%),

concerns related to the efficacy and adverse effects associated with the vaccines (HV:27.7%, Z:26.3%), lack of interest (HB:27.7%, Z:14%), not being in an age group in whom the vaccine was recommended (<60 years) (Z:8.7%) and costs associated with the vaccine (Z:1.7%).
Conclusion: Immunization rates for seasonal influenza, pneumococcal and herpes zoster among RA patients are comparable to those reported in RA cohorts from the USA. The most common patient-reported barriers for non-vaccination are lack of recommendation by a physician, misconceptions related to the efficacy and adverse effects associated with the vaccines and lack of patient interest in receiving the vaccine. Educational strategies targeting both physicians and patients could raise immunization coverage in RA.

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A Qualitative Study of Barriers & Facilitators to Arthritis Patients' use of Physical Activity Monitoring Tools

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Objectives: Physical activity can reduce pain, improve mobility and enhance quality of life in people with arthritis. The 2011 Canadian Community Health Survey reported, however, that less than half of Canadians with arthritis are physically active. While emerging evidence supports the use of some wearable physical activity monitoring tools to support an active lifestyle among patients with chronic diseases, little is known about how to integrate wearable tools to support self-management. We aimed to examine the barriers and facilitators to using these wearable tools from arthritis patients' perspectives.

Methods: Patient focus groups were conducted within a larger project examining the context of using the tools to support arthritis self-management. To be eligible, patients had 1) a diagnosis of osteoarthritis (OA) and/or inflammatory arthritis (IA), 2) any level of experience with the wearable tools, and 3) were English-speaking. Participants were recruited via notices in hospitals and clinics of rheumatologists and rehabilitation professionals, and via online ads. An iterative, thematic analysis approach using constant comparative methods was applied to the data.

Results: In 2014 - 2015, 40 patients (31 women; 9 men) took part in 9 focus groups in-person or by teleconference. Of the 37 participants who provided information, 29 had used a wearable physical activity monitoring tool in the past. 17 (46%) had OA, 13 (35%) had IA, and 7 (19%) had OA and IA. Focus groups ranged from 3-6 participants, and the median age was 59 years (range: 23 –78). Preliminary findings revealed key barriers to patients' use of the wearable tools, including: 1) unfamiliarity with the tools, 2) concern that the tool may be too expensive, and 3) doubts that use of the tool would be sustainable. If use was to be sustained, participants identified the importance of a tool that was user-friendly and provided information that was meaningful to their individual circumstance. Key facilitators were identified as: 1) an existing level of motivation to try out ways to be more active; 2) ease of use of the tool; 3) ongoing support from health professionals to use the tool optimally.

Conclusion: Participants identified the accessibility of the wearable tools and the prospect of their long-term use as hurdles to using them. The patients' perspective also highlighted the

importance of tool design and health professional support in facilitating ongoing use. Findings provide an important first step to informing implementation strategies for patients to use the wearable tools in supporting self-management.

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Use of Social Media by People with Arthritis and Multi-Morbidity: Implications for Self-Management

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Objectives: The use of social media in healthcare is widely advocated and becoming increasingly popular among patients, with 70% of Canadians with Internet access seeking health information online. Social media use has also been shown to foster the ePatient movement, especially with regard to empowering, equipping, enabling and engaging patients. While much of the current literature focuses on how healthcare organizations or clinicians use social media for networking and information sharing, there is little evidence to describe patients' use of social media from their own perspectives. We aim to examine the benefits and harms of the use of social media by patients with multi-morbidity including arthritis, because dealing with multiple chronic conditions complicates self-management.

Methods: We purposively sampled participants for maximum variation to take part in this qualitative study involving one face-to-face in-depth interview and a follow-up phone interview. Eligible participants were adults with a self-reported physician diagnosis of osteoarthritis or any type of inflammatory arthritis, plus at least one other chronic condition (i.e., multi-morbidity). Recruitment was via online ads, notices, and word of mouth. Interviews were audio-recorded and transcribed verbatim. An iterative, constant comparative analysis within and across transcripts is ongoing. Our preliminary findings are visually depicted in a Mindmap diagram.

Results: 17 participants (14 women; 3 men) aged between 23-67 years were recruited. All had accessed social media in the previous 6 months. Blogs and social networking sites (e.g. Facebook, Twitter) were the most common form of social media used. Three emerging themes have been identified. First, participants described how relating to others "in the same boat" via social media gave opportunities to mitigate feelings of isolation, losing control and not being taken seriously. Second, participants felt cautious in setting boundaries to sharing personal information via social media. Third, participants described how using social media was associated with new kinds of 'work' and responsibility.

Conclusion: Findings reveal insights into patient experiences that have ethical implications for health professionals and inform self-management approaches. Recognition of these emerging ethical issues may help reduce potential burdens on patients. Gaining greater understanding of patient experiences of social media could influence an empathetic and holistic view among health professionals in the digital era.

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Is Skin Disease More Important to Women or Men in the Assessment of Disease Activity in Psoriatic Arthritis?

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Objectives: Previous studies have shown gender-specific differences with respect to disease parameters and patient reported outcomes in psoriatic arthritis (PsA). The aim of this analysis was to compare the patient profile at initiation of the first anti-TNF agent and to assess whether skin disease has a bigger impact on PtGA in women vs. men with PsA treated with infliximab (IFX) or golimumab (GLM) in a Canadian real-world, routine clinical practice setting.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, ankylosing spondylitis, or PsA with IFX or GLM. Eligible people for this analysis included PsA patients treated with IFX who were enrolled since 2005 or with GLM enrolled since 2010. The correlation between disease parameters was assessed with the Pearson's correlation coefficient (r), while generalized linear models were used to assess the independent predictors of PtGA.

Results: A total of 238 patients (51.7% male) were included. At baseline, no significant differences in age (49.9 vs. 50.1; P=0.907), disease duration (4.8 vs. 6.2; P=0.214), or concomitant DMARD use (60.2% vs. 58.3%; P=0.765) were observed between genders. Mean (SD) disease parameters (men vs. women) were: PASI: 2.7 vs. 2.7, P=0.985; swollen joint count (SJC28): 4.3 vs. 5.2, P=0.121; tender joint count (TJC28): 5.6 vs. 7.7, P=0.016; HAQ: 1.18 vs. 1.51, P<0.001; pain (VAS mm): 44.2 vs. 50.0, P=0.101; PtGA: 45.4 vs. 51.2, P=0.114; MDGA (0-10 NRS) = 4.9 vs. 5.4, P=0.111. Overall, a weak linear correlation was observed between PASI and PtGA in both men (r=0.272; P<0.001) and women (r=0.203; P<0.001). A moderate to strong correlation was observed between SJC28 and PtGA (mean: r=0.421, P<0.001; women: r=0.398; P<0.001). Univariate analysis independent of time of assessment showed that female gender (ΔPtGA=3.6; P=0.050), higher PASI [ΔPtGA (for each increase in PASI by 1)=2.2; P<0.001], and higher SJC28 (ΔPtGA=3.2; P<0.001), but not baseline age or disease duration, were associated with increased PtGA. However, upon adjusting for PASI (ΔPtGA=1.6; P<0.001) and SJC28 (ΔPtGA=2.7; P<0.001), no significant differences in PtGA were observed between genders.

Conclusion: The results of this analysis show that, upon adjusting for PASI and SJC28, no significant differences exist in PtGA between genders. Furthermore, the association of PtGA was stronger with SJC28 than with PASI in both men and women, suggesting that both genders place more emphasis on articular disease severity than on skin symptoms when evaluating the global status of PsA.

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High Accuracy and Significant Savings using TaqMan® Tag-SNP Genotyping to Determine HLA-B*27 Status in the Newfoundland Population

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Objectives: To determine the clinical validity and the economic impact of replacing the direct HLA-B locus PCR-SSO test for evaluation of chronic back pain with HLA-B*27 tag-single nucleotide polymorphisms (SNPs) in a clinical molecular genetics laboratory setting.

Methods: 1000 consecutive samples were obtained from subjects that required HLA-B*27 testing for evaluation of chronic back pain. These samples had been previously tested using the current clinical method to determine HLA-B*27 allele status (direct HLA-B locus genetic testing by PCR-SSO). Two HLA-B*27 tag-SNPs, rs4349859 and rs1188202, were genotyped to determine HLA-B*27 status using TaqMan® tag-SNP genotyping and a 7900 HT Fast Real-Time PCR System. These results were then compared with the results obtained previously from the current clinical method. Finally, the cost of each method was compared.
Results: 999 of the 1000 samples were successfully genotyped with a single sample having insufficient DNA for amplification. This included 171 HLA-B*27 positive patients and 828 HLA-B*27 negative patients using the current method. There was 100% concordance between both tag-SNP assays; however, the tag-SNP, rs1188202, had better defined genotyping clusters. When the results of the tag-SNP rs1188202 assay were compared with the current standard, the overall accuracy was 99.6% (994/999). The analytical sensitivity and specificity of the tag-SNP rs1188202 assay was 97.6% and 99.9%, respectively, with a false negative rate (FNR) of 2.4% and a false positive rate (FPR) of 0.1%. The total cost per sample of the current clinical test (direct HLA-B locus testing by PCR-SSO) was $55.09, whereas the total cost per sample using TaqMan® tag-SNP genotyping assay was $4.09, which represented a 13.5-fold cost reduction. Furthermore, although both tests required a hands-on time of approximately 60 minutes, almost double the sample volume can be performed using the TaqMan® tag-SNP genotyping assay (20 samples) compared with only 11 samples using direct HLA-B locus PCR-SSO assay, which translates into a reduction in turn-around-time and more efficient resource management in the clinical laboratory. On an annual basis, replacing the PCR-SSO HLA-B*27 test with a tag-SNP test would equate to approximately $25,500 in cost saving.
Conclusion: HLA-B*27 tag-SNPs represents an accurate, cost-effective and time-efficient screening method to clinically determine HLA-B*27 status for SpA patients in the Newfoundland population (and other Caucasian populations) as well as greatly facilitate research by enabling SNP technology and multiplexing of SNPs to HLA-B*27.

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Pregnancy Outcomes in Women with Childhood-onset Systemic Lupus Erythematous from a Large Population-based Cohort

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Objectives: Little is known about maternal, fetal and neonatal outcomes in women with childhood-onset SLE (cSLE). Our objectives were to describe pregnancy outcomes, maternal complications and evaluate risk factors for adverse pregnancy outcomes in women with cSLE.
Methods: A population-based cohort of Ontario cSLE patients was created. All rheumatologists and nephrologists practicing in Ontario were contacted to conduct retrospective review of all cSLE patients diagnosed <18 years old between Jan 1984 and Dec 2011 and followed for ≥1 year. Clinical data including disease manifestations within the first 3 years after diagnosis and

Ontario Health Insurance Plan (OHIP) numbers were securely transferred, transformed, encrypted and linked to multiple administrative datasets at the Institute for Clinical Evaluative Sciences to determine the fetal, neonatal and maternal outcomes of interest. Females aged 15–45 years were included. We used descriptive statistics, chi-squared analysis and conditional logistic regression. The standardized incidence ratio (SIR) of observed to expected live births was calculated.
Results: The mean (±SD) age at diagnosis of 502 women with cSLE was 12.9±3.2 years. Ethnic distribution was White (37%), Asian (24%), Black (16%), South Asian (14%) and other (9%). After a follow-up of 17.7±6.9 years, 226 pregnancies occurred in 110 women, 73 (66%) of whom had at least one live birth. The fetal outcomes of pregnancies were: 107 (47%) live births, 83 (36%) induced abortions, 32 (14%) spontaneous abortions, and 8 (4%) stillbirths. The SIR for live births was 0.378 (95% CI 0.37–0.38). Maternal age at first live birth was 27.2±5.1 years, similar to those at spontaneous abortion or stillbirth but age was lower for induced abortion (23.5±5.0 years, $p<0.001$). Among all live births, 40% were delivered by caesarean section and 29% were complicated by preeclampsia/eclampsia. 51% of neonates were born prematurely, almost half of whom were delivered prior to 28 weeks gestation. There was no increased risk of adverse pregnancy outcome in women with lupus nephritis, antiphospholipid antibodies, and NPSLE within 3 years of diagnosis. Women who were hospitalized (31%), or had a thrombotic event (5%) in the 3 years prior to the first pregnancy were not at increased risk for an adverse pregnancy outcome compared to women without these premorbid complications.
Conclusion: Women with cSLE are at high risk of adverse pregnancy outcomes and maternal complications, have a lower SIR for a live birth, and greater risks of extreme prematurity, stillbirth and caesarean section than reported in healthy women and adult-onset SLE populations.

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IL-1 Blocker Therapy for Articular Flares in PAPA Syndrome

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Background: PAPA syndrome is a rare autosomal dominant autoinflammatory disorder characterized by recurrent Pyogenic sterile Arthritis, Pyoderma gangrenosum and Acne. It is caused by a missense mutation in the PSTPIP1/CD2BP1 gene on the long arm of chromosome 15. This syndrome is associated with secretion of active levels of IL1β due to interaction of PSTPIP1 with pyrin and apoptosis associated speck-like protein containing a CARD for the activation of Caspase 1. Children can present with arthritis alone that can occur spontaneously or sometimes following a minor trauma. Diagnosis and treatment of PAPA syndrome can be challenging. Corticosteroids, anti-TNF agents and recombinant human interleukin (IL)-1 receptor antagonist have been used with variable results.
Objective: To determine the efficacy of the recombinant human interleukin (IL)-1 receptor antagonist anakinra in two cases of PAPA syndrome-associated arthritis
Results: We follow two unrelated patients diagnosed with PAPA syndrome. Case 1 has a positive family history with A230T missense mutation in PSTP1P1 gene. Case 2 has G904A mutation in PSTP1P1 gene with no family history. Both cases have predominant articular disease without any cutaneous involvement. They experienced articular flares following trivial injuries

during contact sports, which earlier responded to short course of corticosteroids. In recent past, they presented with elbow trauma followed by joint and extensive soft tissue swelling of arm. MRI in each case was suggestive of large joint effusion with extensive soft tissue, bone marrow and muscle edema with large fluid collection.
Anakinra was introduced either in view of poor response (case 1) and increase requirement of corticosteroid (case 2). A significant resolution of clinical and biochemical parameters was noted in 2 weeks. Radiological improvement was evident in MRI repeated at 12 weeks. Case 1 receives Anakinra prophylactically following any trauma to prevent an articular disease flare.
Conclusion: Anakinra treatment led to dramatic improvement in arthritis in both patients. Whether it can be used prophylactically after a minor trauma to prevent disease flare is yet to be determined.

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A Systematic Review to Characterize Healthcare Utilization for Indigenous People Living with Arthritis in Canada, New Zealand, Australia and the United States

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Objectives: Disparities in arthritis outcomes are recognized for Indigenous populations in Canada, New Zealand, Australia and the USA. How these disparities relate to patterns of arthritis healthcare utilization is not well studied. The objective of this systematic review was to characterize health services utilization for arthritis conditions by Indigenous populations.
Methods: A systematic search (to June 2015) was performed in Medline, EMBASE, CINAHL, and several Indigenous health databases. Observational studies that reported health service use data by Indigenous populations with arthritis in the countries of interest were included. No restrictions were placed on the type of health service but studies reporting only alternative/complementary services were excluded. Study selection and data extraction was conducted in duplicate.
Results: A total of 19 studies were included; Canada (n=8), New Zealand (n=7), Australia (n=3) and USA (n=1). Arthritis conditions studied included osteoarthritis (OA) (n=7), rheumatoid arthritis (RA) (n=4), gout (n=3), Systemic Lupus Erythematosus (n=2) and multiple diseases (n=3). Except for one study, all studies reported comparisons between Indigenous and non-Indigenous populations for health service use. Indigenous people living with RA and OA in Canada were more likely to visit a primary care physician (adjusted odds ratios, ranging from 1.68 to 1.88). However, Indigenous people living with rheumatic diseases in New Zealand and with OA in Australia were less likely to visit a primary care physician (1 study reported an adjusted odds ratio of 0.84). In Canada and New Zealand, Indigenous people living with rheumatic diseases had less specialist visits than non-indigenous people (3 studies reported crude differences, ranging from 0.4 to 2 less visits/year). In Canada, New Zealand and USA, Indigenous people living with rheumatic diseases were more likely to be hospitalized (2 studies reported adjusted odds ratios ranging from 1.59 to 3.2). In Canada, New Zealand and Australia, Indigenous people living with arthritis were less likely to have a joint replacement (5 studies reported adjusted odds ratios, ranging from 0.19 to 0.72).
Conclusion: Indigenous people's use of primary care physician services for arthritis varied among the countries studied. Indigenous people of Canada and New Zealand were less likely to use specialist services for arthritis care and Indigenous people living with arthritis in the four countries studied were less likely to have an arthroplasty and were more likely to be hospitalized, highlighting important health inequities between Indigenous and non-Indigenous populations

with arthritis.

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Current Smoking, its Intensity and Duration, is Associated with Fat Metaplasia on MRI in Patients with Spondyloarthritis

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Objectives: Smoking has been associated with radiographic severity and progression in SpA although there is little understanding of the mechanism. Prospective MRI data indicates that ankylosis develops following an intermediary phase of fat metaplasia, which follows resolution of inflammation in subchondral bone and at sites of erosion, when it is termed backfill. We aimed to determine whether smoking influences the propensity to develop fat metaplasia as a potential mechanism for its association with progression in SpA.

Methods: In the Follow-up Research Cohort in AS (FORCAST), AS patients from Northern Alberta attending community and academic practices are assessed for clinical and laboratory outcomes every 6 months, MRI is performed at baseline, at 3-6 months for patients starting anti-tumor necrosis factor alpha (anti-TNFα), and annually. MRI scans are scored independently by 2 readers and adjudicated by a third reader according to pre-specified rules. MRI inflammation is assessed on short tau inversion recovery (STIR) scans using the Spondyloarthritis Research Consortium of Canada (SPARCC) Sacroiliac Joint (SIJ) and 23-DVU Spine scores while structural change is assessed independently on T1-weighted (T1W) scans using the SPARCC SIJ Structural Score (SSS) score for fat metaplasia, erosion, backfill, ankylosis, and the Fat AS Spine Score (FASSS). We used univariate and multivariate regression to assess associations between smoking (current (yes/no, <10/ ≥10 years), past, never, pack per day, pack year) and MRI parameters.

Results: The cohort includes 730 patients: mean age 41.3 years, 72.7% males, 78.6% B27 positive, mean disease duration of 17.5 years. Of 517 patients reporting smoking history, 105 (20.2%) were current smokers, 148 (29.0%) past smokers, and 2 (51.8%) never smoked. MRI scans were available on 250 cases in the cohort. In univariate analyses, current but not previous smoking, especially intensity (from 0.25 to 1 pack/day) and duration of current smoking (≥10 years vs <10), was associated with spinal (FASSS: β=11.1, p=0.03)) and SIJ fat metaplasia (SSS backfill: β=2.4, p=0.01; SSS fat ≥2: OR 2.4, p=0.03), SIJ ankylosis (β=4.5, p=0.01), and spinal inflammation (SPARCC 23-DVU (β=8.3, p=0.02). In multivariate models that included age, sex, B27, smoking, ASDAS, and selected according to the best goodness of fit Akaike Information Criterion (AIC), current smoking (intensity and/or duration) was independently associated with SIJ fat metaplasia and ankylosis.

Conclusion: Current, but not past smoking, and its intensity and duration is associated with the degree of fat metaplasia and ankylosis on MRI of the SIJ suggesting that it may influence the tissue response to inflammation.

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Quality of Life in Patients with Active Non Radiographic Axial Spondyloarthritis After 16 Weeks of Golimumab Treatment

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Objectives: Chronic inflammation, back pain, and progressive spinal stiffness associated with axial spondyloarthritis (axSpA) can decrease quality of life (QoL). The purpose of this study was to determine whether golimumab (GLM) is superior to placebo (PBO) in improving the QoL of patients with nr-axSpA.

Methods: GO-AHEAD was a double-blind, randomized, PBO-controlled trial of GLM in patients with active nr-axSpA (ASAS criteria and centrally read sacroiliac joint X-rays and MRI; disease duration ≤5 years; chronic back pain; high disease activity [total back pain ≥40 mm on a 0–100 mm VAS and BASDAI ≥4 cm]; and inadequate response/intolerance to NSAIDs). Patients were randomized 1:1 to SC GLM 50 mg or PBO every 4 wk. Secondary outcomes related to QoL included the 36-item Short Form Health Survey (SF-36), Ankylosing Spondylitis Quality of Life (ASQoL), EuroQoL 5-Dimension (EQ-5D) Index and Health State (0–10 cm VAS), and Work Productivity and Activity Impairment (WPAI) questionnaire scores at wk 16. Treatment group differences for all patients and for the objective signs of inflammation (OSI) population (baseline inflammation by centrally evaluated SI MRI and/or elevated CRP) were compared using a constrained longitudinal data analysis for continuous endpoints and Mann–Whitney test for WPAI scores.

Results: Of 197 treated patients (GLM=97; PBO=100), mean age was 31 years; 57% were male. At wk 16, patients treated with GLM had greater improvements from baseline QoL than patients treated with PBO, as measured by all scales (GLM vs PBO difference [95%CI]): ASQoL (-3.5 [(–4.7, –2.2]), EQ-5D Index (0.15 [0.08, 0.22]), EQ-5D VAS (1.5 [0.9, 2.1]), SF-36 physical (6.6 [4.3, 8.8]), and SF-36 mental (4.2 [1.4, 7.1]); all P<.0001. GLM patients also had greater improvements than PBO patients in percentages of WPAI overall work impairment (−21.1 vs −11.7, P=.0391) and activity impairment (−24.9 vs −8.6, P < .0001); impairment while working and work time missed were not significantly different between groups. Results for QoL and WPAI measures were similar in the OSI population, except that patients in the GLM group also had greater improvements in percentage of impairment while working than the PBO group (P=.0194).

Conclusion: Patients with active nr-axSpA who received GLM treatment had greater improvement in QoL and work productivity outcomes at wk 16 than those who received PBO; however, the mean values indicate that some degree of impairment remained.

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Baseline Demographic and Disease Characteristics Associated with Response to Golimumab in Patients with Active Non Radiographic Axial Spondyloarthritis

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Objectives: Subgroup analyses can be used to investigate the size and direction of treatment effects across a range of demographic and disease characteristics. The purpose of this study was to explore response consistency in subgroups of patients with non radiographic axial spondyloarthritis (nr-axSpA) who received golimumab (GLM) or placebo for 16 wks.

Methods: GO-AHEAD was a double-blind, randomized, placebo (PBO)-controlled trial of GLM in patients with active nr-axSpA (ASAS criteria and centrally read sacroiliac (SI) joint X-rays and MRIs; disease duration ≤5 years; chronic back pain; high disease activity [total back pain

≥40 mm on a 0–100 mm Visual Analogue Scale and BASDAI ≥4 cm]; and inadequate response/intolerance to NSAIDs). Patients were randomized 1:1 to subcutaneous GLM 50 mg or PBO every 4 wks. Estimated between-group treatment differences and 95% CIs for ASAS 20 and ASAS 40 response at wk 16 were calculated for prespecified patient subgroups. Treatment and subgroup differences were compared by stratified Miettinen–Nurminen methods with baseline inflammation by SI joint MRI and screening C-reactive protein (CRP) level as stratification factors. No multiplicity control was applied.
Results: A total of 197 patients were treated (GLM N=97; PBO N=100). Overall, ASAS 20 at wk 16 was achieved by 71.1% of GLM patients and 40.0% of PBO patients; difference = 31.1% (P <.0001). Although size of response differed somewhat across the subgroups, responses were greater to GLM than to PBO in most patient subgroups (P <.05). Because of the small numbers of patients within subgroups and because subgroups may not represent randomized samples, results should be considered exploratory and interpreted with caution. Treatment group differences appeared to be larger in patients with objective signs of inflammation: results for ASAS 20 achieved in patients with positive MRI SI and/or CRP>ULN (GLM N=78; PBO N=80): GLM=76.9%, PBO=37.5%; difference derived from the statistical model = 39.6% (95%CI = 24.6, 52.6); results for ASAS 40 were very similar to those for ASAS 20.
Conclusion: Overall, patients with active nr-axSpA who received GLM were more likely to achieve ASAS 20 at wk 16 than those treated with PBO across a variety of baseline characteristics, including those with baseline objective signs of inflammation (e.g., MRI SI or CRP >ULN).

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Levels of 14-3-3η Protein Supplement CRP, Age and Antibodies to Predict Progression in Patients with Recent-Onset Inflammatory Polyarthritis

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Objectives: Age, C-Reactive Protein (CRP) and RA-associated autoantibodies are established markers in clinical use, associated with worse prognosis. 14-3-3η is a mechanistic marker that up-regulates factors that perpetuate disease that may complement the predictive value of these markers. Our objective was to examine both the independent and combined effects of CRP, age, antibodies and 14-3-3η on radiographic progression.
Methods: Baseline (BL) serum 14-3-3η titres were assessed in recent onset polyarthritis patients from the Sherbrooke EUPA Cohort having completed 5 years of follow-up. Positivity for each marker was defined as: age ≥65 years, CRP >8.0 mg/L, Rheumatoid Factor (RF) ≥40 IU/ml, anti-CCP2 >20.0 U/ml and anti-Sa ≥0.20 Optical Density units. Positivity for 14-3-3η was defined by the manufacturer at ≥0.19 ng/ml. A threshold at 14-3-3η ≥0.50 ng/ml was the optimal threshold established at baseline for prediction of radiographic progression (ΔSvH ≥5) or erosive progression (ΔErosion) from inclusion to 5 years. Generalized estimating equations (GEE) with repeated measures were used to predict risk of ΔSvH ≥5 and ΔErosion ≥5 over 5 years; GEE results were presented as relative risk (RR) and 95% confidence interval (95% CI).

Results: The 331 patients were DMARD naïve at BL, median age 60 years, and 62% female. At BL, 122 (36.9%), 207 (62.5%) and 119 (36.0%) were age, CRP and 14-3-3η positive; RF, anti-CCP and anti-Sa were positive respectively in 146 (44.1%), 133 (40.2%) and 73 (22.1%) patients. All variables were significant to predict erosive progression over 5 years, with the highest RR for anti-Sa (2.22 (1.69-2.92), p<0.001), 14-3-3η ≥0.50 (2.04 (1.53-2.70), p<0.001) and RF (2.02 (1.50-2.72), p<0.001). Coexistence of both 14-3-3η ≥0.50 and CRP >8.0 increased the RR of ΔErosion ≥5 to 3.48 (2.17-5.56), p<0.001 relative to the absence of both; combining 14-3-3η ≥0.50 with age ≥65 years increased the RR of ΔErosion ≥5 to 3.46 (2.21-5.42), p<0.001. Combining 14-3-3η ≥0.50 with either positive RF, anti-CCP2 or anti-Sa barely increased the RR of each individual antibody. The best univariate signature for ΔErosion ≥5 was obtained using a combination of CRP >8.0 mg/L and 14-3-3η ≥0.50 ng/ml and age ≥65 years, with a RR of 5.49 (2.73-11.08) compared to the absence of all 3 variables. Similar results were obtained for ΔSvH ≥5.

Conclusion: Combining 14-3-3η ≥0.50 ng/ml with other markers improve the value of baseline models to explain radiographic damage progression. The optimal combination included CRP, 14-3-3η and age ≥65 years.

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Is Treat-To-Target Really Working? A Longitudinal Analysis in BIODAM

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Objectives: Treating patients with RA towards a target, treat-to-target (T2T) approach, is nowadays recommended. However it has never been assessed whether such a strategy in daily clinical practice really leads to more patients meeting that target.

Methods: Two-year data from BIODAM were used. BIODAM is a prospective cohort including patients in daily practice with RA from 10 countries, who were started or changed on DMARD and/or anti-TNF treatment and were followed-up every 3 months. Participating physicians were required to practice treat-to-target per protocol. At each visit it was decided whether a patient was treated according to T2T-REM or not. The T2T-REM principle was considered met: i) if a patient had already a disease activity score below the target (DAS28-CRP≤2.6) at a certain time point; or ii) if treatment was intensified (by increasing dosage or adding drugs) upon a DAS28>2.6. T2T was also computed using the benchmark for low disease activity (LDA) (DAS28≤3.2) (T2T-LDA). The main outcome was the presence or absence of ACR/EULAR-boolean remission 3 months after T2T-REM(T2T-LDA). The relationship between T2T and ACR/EULAR Boolean remission 3 months later was investigated using generalized estimating equations with auto-regression.

Results: In total 3084 visits of 539 patients (mean (SD) age: 56 (13) years, 76% female, disease duration 6 (8) years, 49% DMARD-naive). In 68% of the visits, T2T-REM was applied (in 79% of the visits T2T-LDA was applied). ACR/EULAR-boolean remission was reached in 15% of the visits, DAS28 remission in 39%, DAS28-LDA in 53%, CDAI remission in 16% and SDAI in

18%. Appropriate application of T2T-REM led to a 52% higher likelihood of ACR/EULAR-boolean remission 3 months later than not applying T2T-REM (OR (95%CI): 1.52 (1.20; 1.93). Both T2T-REM and T2T-LDA strategies led to lower disease activity (with the exception of DAS28 remission or DAS28-LDA). Only 9% of the treatment intensifications followed upon a DAS28 between 2.6 and 3.2, and 79% of the intensifications were applied upon a DAS>3.2. The effect of T2T-REM on ACR/EULAR-boolean remission was stronger in DMARD-naive patients (OR: 2.10 (1.45; 3.03) than in DMARD-experienced patients (OR 1.20 (0.86; 1.66))(P-value for the interaction:<0.05).

Conclusion: A treat-to-target approach, even with a modest benchmark (DAS28=3.2), works instantaneously and leads to higher ACR/EULAR-remission rates. T2T is more effective in DMARD-naïve than in DMARD-experienced patients. Rheumatologists should be encouraged to follow a treat-to-target approach in order to improve the outcome of their patients.

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Risk of Chronic Obstructive Pulmonary Disease (COPD) in Rheumatoid Arthritis (RA): A Population Based Study

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Objectives: A link between COPD and inflammation has been established in a number of studies. This raises the question of whether chronic inflammatory conditions, such as RA, predispose to COPD. The objective of this study was to evaluate the risk of incident COPD in RA compared to the general population.

Methods: We conducted a retrospective cohort study of a population-based incident RA cohort with matched controls from the general population, using administrative health data. Incident RA cases were selected if they had ≥2 doctor visits > 2 months apart for RA between 01/1996 and 03/2006, with no prior RA diagnosis since 1990. Cases were excluded if they had ≥2 subsequent doctor visits for another inflammatory arthritis ; if they saw a rheumatologist and the RA diagnosis was never confirmed; or if there were no subsequent RA visits over a follow-up >5 years. Controls were randomly selected from the general population, matched with a 1:1 ratio on birth year, gender and calendar year of inclusion. Individuals with inpatient or outpatient visits for COPD prior to index date were excluded. RA cases and controls were followed until 03/2010. COPD outcome was defined using previously validated definitions of one hospitalization with ICD-9 codes: 491, 492, 493.2, 496; or ICD-10 codes: J43, J44. Incidence rates and 95% CI were calculated for the RA cohort and controls, along with incidence rate ratios (IRR). Multivariable Cox proportional hazard models were used to estimate the risk of COPD in RA compared to controls after adjusting for potential confounders. Because smoking is a risk factor for both RA and COPD unavailable in administrative data, sensitivity analyses were performed to test the possible confounding effect of smoking, modeled with an OR of 1.3-3.0 and smoking prevalence of 10-20%.

Results: The sample included 24,625 incident RA cases (67% female; mean [SD] age 57.2[17.1] years) and 25,537 controls contributing 170,401 and 184,416 person-years of follow-up, respectively. The incidence rate of COPD per 1000 person-years was 5.23 in RA and 2.99 in controls (IRR = 1.75). The aHR (95%CI) for COPD in RA vs controls was 1.42(1.27-1.60). The

increased risk remained significant after modeling for smoking.
Conclusion: In our population-based cohort, individuals with RA had a 42% greater risk of developing COPD compared to controls. This has important clinical implications for clinicians and people living with RA, supporting the importance of controlling inflammation, addressing COPD risk factors (e.g. smoking), and testing for COPD, as indicated.

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How Accurate is Spot Urine Protein/Creatinine Ratio in Measuring the Change Over Time in Proteinuria Level Compared to the 24 Hour Proteinuria Test in Lupus Patients?

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Objectives: To determine if the Protein/Creatinine ratio in a spot urine sample (PCR) can accurately measure change in proteinuria level over time when compared to the "gold standard" test (Protein content in a 24 hours urine collection [24H-P]) in lupus patients.
Methods: Analysis from a lupus centre between 2008 and 2014. Concurrent urine samples for PCR and 24H-P were identified. At baseline visit, urine samples with abnormal 24H-P (³0.5 g/day) and normal 24H-P (<0.5 g/day) were identified. In the group with abnormal 24H-P, the first follow up visit with 50 and 100% improvement of 24H-P, was identified and compared to the PCR results at this visit. In the group with normal 24H-P, the first follow up visit with worsening of 24H-P (³0.5 g/day) was identified and compared to the PCR results at this visit. Abnormal PCR is >0.05 g/mmol. Standardized Response Mean (SRM) for 24H-P and PCR for 50 and 100% improvement and for 100% worsening were calculated. Hypothesis: 24H-P and PCR will change in the same direction but the effect captured by 24H-P is larger than PCR.
Results: 1188 paired samples from 230 patients. 24H-P 100% improvement: 60 patients started with abnormal and had 100% improvement on follow up. Mean duration for improvement: 17.5 months. Only 53.3% had 100% improvement based on PCR. SRM for 24H-P: -1.00 (95% CI: -1.31 to -0.69) (large effect). SMR for PCR: -0.69 (95%CI: -0.97 to -0.41) (moderate effect). 24H-P 50% improvement: patients started with abnormal 24H-P and had 50% improvement on follow up. Mean duration for improvement: 13.6 months. Only 56% of patients had 50% improvement based on the PCR. SRM for 24H-P: -1.27 (95% CI: -1.61 to -0.95) (large effect). SMR for PCR is -0.63 (95% CI: -0.90 to -0.36) (moderate effect). 24H-P worsening: 43 patients had normal 24H-P at baseline visit (but 34.9% patients had abnormal baseline PCR) and became abnormal on follow up. Mean duration for worsening of proteinuria: 10.5 months. At first visit with abnormal 24H-P, 79.1% had abnormal results by PCR. SRM for 24H-P: 0.81 (95% CI: 0.46 to 1.15) (large effect). SMR for PCR: 0.53 (95%CI: 0.21 to 0.85) (moderate effect). Magnitude of change for improvement and worsening: SRM24H-P > SRMPCR
Conclusion: PCR is not as accurate as 24H-P in determining change in proteinuria. 24 H-P should be used to monitor improvement or deterioration of proteinuria in lupus patients.

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Diagnostic and Screening Accuracy of Spot Urinary Protein – Creatinine Ratio Compared to Protein Content in a 24 Hour-Urine Collection in Systemic Lupus Erythematosus: Systematic Review and Meta-Analysis

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Objectives: To systematically review literature on the utility of spot urinary protein-creatinine

ratio (PCR) as a screening test for proteinuria and its ability to accurately measure proteinuria compared with 24 hour urine collection (24H-P) in patients with Systemic Lupus Erythematosus (SLE).
Methods: Literature search (1900 – 2015) for articles comparing PCR and 24H-P in SLE patients in the databases Medline, Web of Science and Embase. Included studies and their results were critically appraised and analyzed.
Results: 13 studies (1001 patients; 84.01% women) were included. 10 studies reported on Pearson correlation (range: 0.67-0.94); 3 studies reported on Spearman correlation (range: 0.78-1). The meta-analysis of studies with Pearson correlation showed a high overall correlation of 0.80 between 24H-P and PCR however with high heterogeneity (I2=97.2%). Correlation analysis is not sufficient to evaluate the utility of a new test against the gold standard test and analysis on agreement is required. Seven studies reported on agreement: 3 studies analyzed Concordance Correlation Coefficient (0.48-0.94); 3 Intraclass Correlation Coefficient (0.66-0.95) and 1 kappa (0.58). These results confirmed that the agreement between 24H-P and PCR was inappropriate. Three studies included Bland-Altman plot and the results also demonstrated poor agreement between both tests.
Conclusion: The PCR has a utility as a screening test for proteinuria in SLE patients. The studies' results of 24H-P and PCR showed poor agreement between both tests signifying that PCR should not substitute the gold standard test (24H-P) to accurately measure proteinuria.
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Development and Usability Testing of ANSWER-2: A Web-Based Decision Aid for Patients with Rheumatoid Arthritis Considering Biologic Therapy
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Objectives: Patient decision aids are designed to help individuals choose between treatment options by presenting information on potential benefits and harms and clarifying preferences relevant to the options. We developed an interactive web-based decision aid, ANSWER-2, for patients with rheumatoid arthritis (RA) considering starting or switching biologic therapy. The current study aims to test the usability of ANSWER-2.
Methods: The ANSWER-2 decision aid was developed consistent with the International Patient Decision Aid Standards. ANSWER-2 is a second iteration of ANSWER, a decision aid for RA patients considering methotrexate. ANSWER-2 consists of: 1) video clips featuring a rheumatologist discussing treatment options for RA and real patients discussing their experiences with using biologics, 2) questionnaires to clarify patients' treatment preferences and 3) a customized table providing recommendations on biologics. Eligible participants for usability testing were patients with RA currently using biologics or recommended to use them. Recruitment and testing continued until no new navigational issues were found. The concurrent Think-Aloud method was used to help participants verbalise their thoughts while completing ANSWER-2. Sessions were audiotaped. We conducted content analysis to identify

major themes of the user experience. Participants completed the System Usability Scale (SUS) to assess the overall usability of the decision aid (range=0-100; higher=more user friendly).
Results: Seven patients participated in usability testing; six were female and five were between ages 50 and , all with less than university education. Median disease duration was 5.3 years (IQR 2.5-4). Average internet usage was 2.5 h/day, with more than half using the web to find medical information. Participants took an average of 35 minutes (SD=10) to complete the program. The mean SUS score was 83.2 (SD=15.3), suggesting good overall usability. Content analysis of audiotapes revealed two key issues about ANSWER-2 that required modification: 1) navigational control (e.g. scrolling, transitioning from page to page, entering and verifying responses), and 2) information clarity (e.g. visual representations of numerical information on the benefits and risks of biologics). Overall, participants felt comfortable with the layout design and with using the video resources. Based on the results, we made modifications to the instructions and placement of buttons to improve navigational control.
Conclusion: We found that the ANSWER-2 prototype was user-friendly based on the SUS score. Findings from participant interviews, however, revealed issues that should be addressed to further enhance user experience. Our findings illustrate the importance of usability testing in software development for patients and health professionals.

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Examining Perceived Risk Factors of Arthritis: Findings from a Public Opinion Survey

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Objectives: Understanding current public perceptions about risk factors for arthritis is important for developing population-level awareness and prevention initiatives. Many modifiable risk factors, such as obesity, smoking and a sedentary lifestyle are associated with some types of arthritis. However, little is known about the public's knowledge in this area. Our objective is to describe Canadians' perceptions of risk factors for inflammatory arthritis (IA) and osteoarthritis (OA). Findings from this study can help identify how public perspectives compare with research findings about risk factors.
Methods: This study was conducted as part of ICON (Improving Cognitive and Joint Health Network), a CIHR Knowledge Translation Network that supports health and information scientists in applying research in musculoskeletal and cognitive health towards developing technology to improve disease management and mobility. We conducted an online public survey between July and August 2014 across Canada, in both English and French. Invitations were distributed through social media channels of partner organizations, including Arthritis Consumer Experts, CARP (formerly Canadian Association of Retired Persons), and Alzheimer's Society of British Columbia. Participants responded to open-ended questions on what might increase a person's risk of developing IA and OA. We conducted content analysis, whereby data were coded independently by 3 researchers and the participants' perceived risk factors for IA and OA were described.
Results: A total of 1020 people attempted the survey; of those, 750 (73.5%) completed the questionnaire. 80.3% were female and 54.7% were over the age of 55. 82.9% lived in a big city with at least one hospital. 26.0% stated they had OA, 17.9% had a form of IA, while 40.9% reported not having a chronic disease. 'Genetics' was most frequently identified as a risk factor

for both IA (51.1%) and OA (32.4%). Being overweight (30.5%), living a sedentary lifestyle (29.1%), and previous joint injury (24.9%) were also commonly mentioned for OA. On the other hand, 12.5% perceived 'poor diet and nutrition' as a risk factor for IA. Interestingly, 31.5% of respondents either did not list any risks factors or stated that they were not aware of any risk factors for IA.
Conclusion: More than half of the respondents and over 1 in 3 identified genetics as a risk factors for IA and OA, respectively. In contrast, fewer than 1 in 3 people identified a sedentary lifestyle and previous injury as risk factors for OA. These findings highlight the need to increase public awareness about modifiable risk factors for arthritis.

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Renal Histopathological Changes and Clinical Characteristics of Antiphospholipid Nephropathy in Lupus Nephritis Patients

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Objectives: To evaluate the renal histopathological changes and clinical characteristics associated with antiphospholipid syndrome nephropathy in lupus nephritis patients.
Methods: This study included 50 SLE patients with lupus nephritis who had been referred for renal biopsy. Patients underwent clinical and laboratory assessment for disease activity and damage. The biopsy specimens were classified by the international society of nephrology/renal pathology society (ISN/RPS) classification, activity and chronicity indices, and assessed for renal vascular lesions of APSN; acute APSN (thrombotic microangiopathy; TMA) and chronic APSN lesions; fibrous intimal hyperplasia (FIH), fibrous arterial/arteriolar occlusion (FAO) focal cortical atrophy (FCA).
Results: APSN lesions were found in 17/50 patients (34%); 7/50 patients (14%) had TMA lesions suggestive of Acute APSN, while chronic APSN lesions were detected in 15/50 patients (30%). Five cases had simultaneous acute and chronic APSN lesions. LN patients with APSN changes had significantly higher age and SLICC scores (p=0.032 and 0.004 respectively), but there was no difference in renal and APS manifestations. Lupus anticoagulant (LAC) positivity was significantly more frequent in APSN, acute APSN and chronic APSN (p=0.002, p=0.001, p=0.001 respectively). LN patients with APSN had significantly higher renal chronicity scores (p=0.033) with significantly more frequent interstitial fibrosis and tubular atrophy (p=0.006 for each). No significant differences in the distribution of LN classes in patients with APSN. Patients with acute APSN (TMA) lesions had higher serum creatinine (p=0.031), lower estimated glomerular filtration rate (eGFR) (p=0.023), higher SBP and DBP (p=0.018 and 0.019 respectively), and consumption of C3 (p=0.002) than those without. While in those with chronic APSN lesions, no differences were noted in proteinuria, serum creatinine level, eGFR, systemic hypertension (both systolic and diastolic) or C3 and C4 consumption than those without.
Conclusion: APSN is frequently found in LN patients irrespective of LN class and APS manifestations. It is associated with LAC positivity, higher disease damage scores and renal biopsy chronicity indices, particularly interstitial fibrosis and tubular atrophy. Acute APSN was significantly associated with renal impairment and systemic hypertension. Only identification of intrarenal vascular lesions could characterize these patients, so isn't it time to revisit the ISN/RPS 2003 classification of LN to include renal vascular lesions of APSN?

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Pregnancy Outcomes in Egyptian Lupus Patients with and without Anti-phospholipid

Syndrome: Observational Study

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Objectives: To compare the pregnancy outcomes in Egyptian lupus patients with and without APS.

Methods: Observational study assessed the feto-maternal outcomes in a total of 91 pregnancies in women with SLE was done. Group "A" represented SLE patients with secondary APS (n= 35 pregnancies) and group "B" represented SLE patients without APS (n=56 pregnancies).

Results: APS was associated with higher antenatal flare rate (OR: 10.3, 95% CI: 1.2 to 85, p= 0.03) and higher fetal loss (OR: 14.5, 95% CI: 1.8 to 114.3, p= 0.01). APS was not found to be a predictor of preeclampsia or prematurity in logistic regression analysis. However, group A had less planned pregnancy, more renal affection and more patients with hypertension that could explain the more antenatal flares, more premature deliveries and more preeclampsia in this group.

Conclusion: The presence of 2ry APS in pregnant SLE patients can affect the pregnancy outcome not only through increased fetal loss but also these patients had higher renal affection and less planned pregnancy which could explain higher rates of antenatal flare, hypertension, preeclampsia and prematurity in this group. Planned pregnancy, controlling the renal disease and blood pressure are all essential factors for better outcome in pregnant SLE patients especially those with 2ry APS.

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Impact of Disease Duration on Patient Reported and Clinical Outcomes in Patients with Ankylosing Spondylitis Treated with Anti-TNF: An Analysis from a Prospective, Observational Registry

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Objectives: Previous studies have shown that treatment outcomes are affected by disease-related aspects and patient-related factors. The aim of this analysis was to investigate the impact of disease duration on patient reported and clinical outcomes in patients treated with anti-TNF in a Canadian routine clinical practice setting.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment with infliximab (IFX) or golimumab (GLM). Eligible people for this analysis included ankylosing spondylitis (AS) pts treated with IFX and enrolled since 2005 or with GLM and enrolled since 2010. Patients were classified in three subgroups (≤1 yr, 2-10 yrs, >10 yrs) based on the tertile distribution of the time elapsed since their diagnosis. The impact of disease duration on outcomes upon adjusting for potential confounders was assessed with generalized linear models and logistic regression.

Results: A total of 580 pts were included in this analysis with a mean (SD) age of 45.8(12.2) yrs and disease duration since diagnosis of 8.3(10.2) yrs. The majority were male (61.8%) and 92.6% were biologic naïve. At baseline, mean (SD) BASFI was 5.6 (2.6), BASDAI was 6.2 (2.2), and ASDAS was 3.6 (1.0). With the exception of age which was significantly higher among pts with longer disease duration (43.7 vs. 43.5 vs. 50.0, respectively; P<0.001) no significant between-group differences were observed in baseline demographics and disease parameters. Upon 6 months of treatment, clinically meaningful and statistically significant improvements were observed in BASFI, BASDAI and ASDAS which were further enhanced at 12 months. Upon adjusting for baseline age and respective parameter levels, pts diagnosed within ≤1 yr experienced significantly lower improvements in BASFI (-1.5 vs. -2.3; P=0.030), BASDAI (-1.6 vs. -2.9; P<0.001), and ASDAS (-1.5 vs. -2.3; P=0.030) at 12 mos as compared to pts with disease duration >10 ys. For ASDAS, concomitant DMARD use was also identified as a significant predictor of improved outcome (P=0.042). Inactive disease or moderate disease activity, based on ASDAS, was achieved by 47.2% of pts while clinically important and major improvements were observed for 54.9% and 32.7% of pts, respectively.
Conclusion: The results have identified prior disease duration at anti-TNF initiation as a significant independent predictor of treatment outcome. In addition, concomitant use of a DMARD was associated with significantly higher improvement in ASDAS. These results suggest that patients with early disease may be harder to treat and highlight the need for more aggressive treat-to-target approaches in this patient subgroup.

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Gender Specific Differences in Ankylosing Spondylitis at Treatment Initiation in Patients Treated with Infliximab or Golimumab

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Objectives: The prevalence of ankylosing spondylitis (AS) is 2-3 times higher in men compared to women. Recent studies have suggested that clinical differences exist between both genders with women experiencing a higher burden of disease. This analysis examined gender-specific differences with respect to patient and disease parameters at initiation of infliximab (IFX) or golimumab (GLM) for the treatment of AS in a Canadian routine clinical practice setting.
Methods: Biologic Treatment Registry Across Canada (BioTRAC) is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, ankylosing spondylitis, or psoriatic arthritis with IFX or GLM. Patients with AS treated with IFX who were enrolled since 2002 or with GLM enrolled since 2010 were included in this analysis. Between group differences were assessed with the Fisher's Exact test or the independent samples t-test, while linear regression was used to assess the independent association of gender with HAQ-DI, ASDAS, BASDAI, and BASFI improvements at 12 months.
Results: A total of 539 AS patients were included in this analysis of whom 351 (65.1%) were treated with IFX and 188 (34.9%) with GLM. The majority of patients were male (61.8%). Baseline age, disease duration, previous biologic use, concomitant DMARD use and concomitant

NSAID use were comparable between genders for both IFX and GLM. Among patients treated with IFX, mean (SD) CRP was significantly lower in female patients as compared to males (12.5 (17.6) vs. 19.2 (26.9) mg/L; P=0.012); however BASDAI (6.6 (2.1) vs.6.0 (2.1); P=0.013) and HAQ-DI (1.27 (0.63) vs.1.11 (0.58); P=0.019) disease parameters were significantly higher among females. For GLM, disease parameters were overall similar between-groups with the exception of BASDAI where a higher score was observed among females (6.5 (1.7) vs.5.6 (2.3); P=0.007). Other baseline disease parameters including ESR, PtGA, MDGA, ASDAS, BASFI, and morning stiffness were statistically comparable (P>0.05) between groups for both agents. Regression analysis showed that, upon adjusting for baseline levels, female gender (ΔBASDAI=0.603; P=0.035) was associated with increased BASDAI at 12 months of treatment as compared to males. HAQ-DI, ASDAS, and BASFI, on the other hand, at 12 months were comparable between genders.

Conclusion: Overall, at anti-TNF initiation, female AS patients experience greater disease activity relative to men at initiation of biologic therapy. Whether this represents a gender bias in prescribing, concomitant fibromyalgia, a gender based difference in the acceptance of biologic treatment or disease assessment, requires additional research.

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Minimal Disease Activity among Psoriatic Arthritis Patients in Canada: Evaluation of Modified Minimal Disease Activity upon Elimination of Each Component

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Objectives: Minimal disease activity (MDA) is now considered an attainable target in psoriatic arthritis (PsA) reflecting a desired state of comprehensive disease control. MDA is defined as the fulfillment of ≥5 of the following criteria: TJC28≤1, SJC28≤1, PASI≤1, pain (VAS) ≤15 mm, PtGA (VAS) ≤20 mm, HAQ≤0.5, and tender entheseal points ≤1. It is made up of objective and subjective outcomes. The aim of this analysis is to assess the contribution of each criterion in preventing the achievement of MDA at 6 and 12 months.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis (RA), ankylosing spondylitis (AS), or psoriatic arthritis (PsA) with infliximab (IFX) or golimumab (GLM). Eligible patients for this analysis included PsA patients treated with IFX or GLM between 2005 and 2010. Modified MDA (mMDA) was evaluated by removing patient-reported outcomes, one criterion at a time, and mMDA achievement was defined as patients who met 4/6 criteria.

Results: A total of 223 PsA patients (51.4% male) were included with a mean (SD) age of 49.8 (11.1) years and disease duration since diagnosis of 5.4 (6.3) years. MDA was achieved by 11.7%, 43.5%, and 44.8% at baseline, at 6 and 12 months of treatment, respectively. At 6 months of treatment the proportion of patients who achieved mMDA upon removing one criterion at a time increased to 54.3% for pain removal, 52.2% for PtGA removal, 50.7% for HAQ removal; while the removal of objective measures did not increase in substantial manner the percentage of patients achieving mMDA: 46.4% for TJC removal, 44.9% for PASI removal,

44.2% for SJC removal, and 44.2% for enthesitis removal. Similar findings were seen at 12 months: the proportion of patients achieving mMDA upon removing HAQ was 58.1%, pain was 57.1%, PtGA was 55.2%, TJC was 50.5%, SJC was 48.6%, PASI was 46.7%, and enthesitis was 45.7%. The highest proportion of mMDA achievement at 6 and 12 months of treatment was observed upon the removal of patient reported pain, PtGA and HAQ.
Conclusion: The results of the current analysis have shown that the most common limiting factors in achieving MDA in PsA are patient reported outcomes, including PtGA, pain, and HAQ. Elimination of each of these criteria from the MDA formula would result in as many as 13% additional cases of MDA.

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Patients' Reported Perceived Deficits Questionnaire - 5-Item is Not Valid to Screen for Cognitive Impairment in Lupus

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Objectives: It is unclear whether cognitive complaints in SLE patients are indicative of true Cognitive Impairment (CI) or underlying depression or anxiety. We aimed to determine: 1) validity of patient-reported outcome on CI (Perceived Deficits Questionnaire – 5-item [PDQ-5]) and 2) association of PDQ-5 with self-reported symptoms of depression and anxiety.
Methods: Consecutive patients followed at a single centre and seen between Feb 2014 and June 2015 were recruited. Patients completed PDQ-5, which assessed perceived cognitive deficits from the patient's perspective. PDQ-5 included five questions representing four subscales: Attention/Concentration, Retrospective Memory, Prospective Memory, and Planning/Organization. Total PDQ-5 score consisted of the sum of raw scores on these 5 items (range 0-20; higher scores = greater perceived deficit). Patients underwent two cognitive screening tests by two trained assessors: Hopkins Verbal Learning Test-Revised (HVLT-R) and Montreal Cognitive Assessment (MoCA). Patients also completed Centre of Epidemiologic Studies Depression Scale (CES-D) and Beck Anxiety Inventory (BAI). Prevalence of self-reported cognitive deficits, depression and anxiety were determined and scores from these questionnaires were compared in patients with and without CI (based on HVLT-R). Sensitivity (Se)/Specificity (Sp)/Positive Predictive Value (PPV)/Negative Predictive Value (NPV) of PDQ-5 in detecting CI (based on HVLT-R and MoCA, separately), depression (CES-D) and anxiety (BAI) were studied.
Results: Of 79 patients, 46% self-reported cognitive difficulties occurring ‘often' or ‘almost always' in at least one of PDQ-5's four subscales. 44% reported depressive symptoms by CES-D, and 25% reported moderate-severe anxiety by BAI. CES-D showed higher scores in patients with CI than those without CI (21.9±13.4 vs. 15.3±10.6, p=0.008) [higher scores = more depressive symptoms]. There were no significant differences in BAI or PDQ-5 scores between patients with and without CI. Se, Sp, PPV and NPV were high in both CES-D (Se 65%, Sp 74%, PPV 69%, NPV 71%) and BAI (Se 95%, Sp 68%, PPV 50%, NPV 98%) signifying that PDQ-5 is detecting depression and anxiety. PDQ-5 was less predictive of objective CI (MoCA: Se 52%, Sp 40%, PPV 36%, NPV 56%; HVLT-R: Se 48%, Sp 58%, PPV 37%, NPV 68%).
Conclusion: PDQ-5 self-report questionnaire is not a valid test to screen for CI in SLE. Depression and anxiety among SLE patients were highly prevalent using CES-D (44%) and BAI (25%) and depression was associated with CI. Patients' cognitive complaints reported in PDQ-5

scores were not reliably associated with performance on MoCA or HVLT-R, but rather were influenced by the presence of depression/anxiety.

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Exploration of Associations between Air Pollutants and Familial or Non Familial Forms of Paget's Disease of Bone

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Objectives: Genetic factors are important in Paget's disease of bone (PDB), but environmental factors have also been reported. We aimed at exploring the associations between outdoor and indoor air pollutants in familial (F-PDB) and non familial (NF-PDB) forms of PDB.

Methods: We recruited 138 patients with PDB, 67 F-PDB and 71 NF-PDB, and 113 healthy controls from our French-Canadian cohort. Exposure was estimated using a questionnaire on the history of residence and proximity to sources of outdoor air pollutants such as highways, bus, train or airport stations, and gas stations. Regarding indoor air pollutants, questions on heating combustibles (coal, wood, oil) used in past residences and tobacco exposure were also used. Odds ratio (OR) and 95% confidence intervals were calculated to evaluate associations between air pollutant exposures and F-PDB or NF-PDB.

Results: After adjustment for gender, patients with F-PDB were less frequently exposed to outdoor air pollutants than NF-PDB patients and controls: residence close to highways (F-PDB 55.2%, NF-PDB 81.7%, and controls 80.5%; OR=0.27 [0.13-0.53], p=0.0003), residence close to highways in childhood (F-PDB 20.9%, NF-PDB 42.2% and controls 78.8% ; OR=0.06 [0.03-0.13], p<0.0001), residency close to bus, train or airport stations in childhood (F-PDB 3.0%, NF-PDB 8.4% and controls 18.6%; OR=0.13 [0.03-0.57], p=0.0096), whereas NF-PDB patients were less likely to have a residence close a gas station during childhood (NF-PDB 14.1%, F-PDB 14.9%, and controls 24.8%; OR=0.36 [0.15-0.85], p=0.033). Wood heating exposure during childhood was the only indoor air pollutant positively associated with PDB, in particular in patients with F-PDB: F-PDB 88.1%, NF-PDB 81.7% and controls 67.3%; OR=2.97 [2.10-7.73] for F-PDB and OR=2.61 [1.12-7.93] for NF-PDB, p=0.035).

Conclusion: Patients with familial forms of PDB were less frequently exposed to outdoor air pollutants, which is consistent with the known association with rural residency, whereas both patients with familial and non familial PDB were more frequently exposed than controls to wood heating during childhood. Atmospheric pollution-induced cellular oxidative stress has recently been incriminated as a key pathogenetic mechanism involved in common autophagy-mediated aging diseases, such as PDB.

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First Presentation of Inflammatory Bowel Disease as a Migratory Polyarthritis with Positive C-ANCA and PR3

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A previously healthy 32 year-old female, with a past medical history significant for lactose intolerance and whose only medication was the oral contraceptive pill, presented to hospital with a history of intermittent migratory polyarthritis over the past year with an associated bruise-like

rash. Episodes of arthritis had gradually increased in frequency and severity such that involvement of her ankles rendered her unable to ambulate. She also endorsed a 24-hour history of watery, bloody diarrhea. Further questioning later revealed a history of intermittent diarrhea over the past several years, which she had attributed to lactose intolerance. Physical exam was significant for effusion and soft tissue swelling of the left wrist and ankle, with associated 2-4 cm erythematous, non-blanching cutaneous lesions on the affected joints, which evolved to a bruise-like appearance over the next few days. C4 was decreased, and ESR (50) and CRP () were both elevated. Serological investigations were significant for a positive ANA (1:160), C-ANCA, PR3, and anti-TTG (115). A CT of her abdomen demonstrated pan-colitis, and a colonoscopy conducted was grossly consistent with ulcerative colitis, later confirmed by biopsy samples. Duodenal biopsies showed intraepithelial lymphocytosis associated with increased anti-TTG IgA, suggestive of celiac disease. A punch biopsy of one of the lesions on her skin demonstrated leukocytoclastic vasculitis. The patient was started on 50 mg of oral prednisone, and reported symptom improvement prior to discharge.

Up to 40% of IBD patients experience extra-intestinal manifestations, with peripheral arthritis and erythema nodosum being the most common. Type I arthropathy, consistent with this presentation, is seen early in the course of bowel disease, is classically asymmetrical, may be migratory, and may improve with treatment of the IBD. In terms of cutaneous manifestations, erythema nodosum, pyoderma gangrenosum, and aphthous stomatitis are most common in IBD. Leukocytoclastic vasculitis is a more rare cutaneous IBD manifestation. When present, it may appear as palpable purpura on the lower extremities. It usually resolves with treatment of IBD. In terms of positive ANCAs, P-ANCA positivity is well-documented in Ulcerative Colitis patients, and is used in combination with Anti-Saccharomyces cerevisiae to determine between the diagnoses of Crohn's and Ulcerative Colitis. Interestingly, although PR-ANCA positivity is much less commonly seen, a study from Xu et al. in 2008 demonstrated that of all UC patients, those with PR-ANCA positivity shared a common, severe UC phenotype, characterized by moderate to severe activity, involvement of the entire colorectum, and frequent relapses.

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Comparison of Baseline Characteristics of Rheumatoid Arthritis Patients Initiating Therapy with Subcutaneous Golimumab and Infliximab and Intravenous Golimumab: An Analysis from the Prospective, Observational Registry, BioTRAC

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Objectives: The selection of patients' initial biologic therapy in rheumatoid arthritis (RA) is dictated by various factors such as baseline disease activity though may also account for physician or patient preference. Health Canada's approval of intravenous golimumab (GLM-IV) in 2013 increased the armamentarium of biologic therapies for the treatment of moderate-to-severe rheumatoid arthritis (RA). The aim of the present analysis was to compare baseline characteristics of RA patients initiating subcutaneous golimumab (GLM-SC) and infliximab (IFX) as well as GLM-IV.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA,

ankylosing spondylitis, or psoriatic arthritis. RA patients enrolled during 2010-2015 for GLM-SC or IFX and during 2014-2015 for GLM-IV were included. Baseline continuous variables were assessed with one-way ANOVA (normal distribution) or the Kruskal-Wallis test (non-normal distribution). Categorical variables were assessed with bivariate Chi-square analyses.
Results: A total of 475 RA patients were included in the analysis; mean (SD) age was 56.86 (13.26) years and 75.3% were females. The majority of patients administered GLM-SC (66.9%; n=318) while 24.2% (n=115) and 8.8% (n=42) of patients received IFX and GLM-IV, respectively. A statistical trend was observed for mean (SD) disease duration between groups (GLM-IV: 5.29 (6.25), GLM-SC: 8.04 (8.65), IFX: 7.35 (8.36); p=0.060). Furthermore, a significantly higher proportion of GLM-IV patients were exposed to a previous biologic (GLM-SC: 7.2%, IFX: 6.3%, GLM-IV: 23.8%; p<0.001). A statistical trend was observed in patients who administered GLM-SC with generally higher disease activity at baseline compared to patients receiving IFX and GLM-IV, with mean (SD) MDGA [5.58 (2.24), 5.18 (2.34), 4.95 (2.34); p=0.143], SJC [7.83 (5.73), 6.73 (5.94), 6.45 (3.68); p=0.101], SDAI [30.50 (15.96), 26.42 (16.02), 26.98 (11.29); p=0.088] and DAS28-CRP [4.80 (1.48), 4.43 (1.49), 4.75 (0.95); p=0.135], respectively. A lower proportion of patients in the GLM-IV group were male (GLM-SC:27.6%, IFX:23.6%, GLM-IV:14.3%; p=0.118), had a family history of rheumatic diseases (GLM-SC:31.3%, IFX:41.4%, GLM-IV:30.0%; p=0.133), were previous smokers (GLM-SC:45.4%, IFX:34.1%, GLM-IV:28.1%; p=0.051), and presented with positive rheumatoid factor (GLM-SC:53.8%, IFX:.5%, GLM-IV:34.3%; p=0.006) compared to GLM-SC and IFX patients. Baseline age, disease duration, CDAI, PtGA, TJC, pain, current smoking status, employment status, and presence of anti-CCP antibodies were statistically comparable between groups (p>0.05).
Conclusion: The results of the current analysis show that differences may exist in the baseline patient profile between different anti-TNF agents possibly suggesting channeling bias due to preferential prescribing. Additional analyses with larger number of patients are required to further validate this.

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A Case of TTP in a Patient with MCTD and Elevated ADAMTS13 Antibodies

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Thrombotic thrombocytopenic purpura (TTP) is a thrombotic microangiopathy caused by severely reduced activity of the von Willebrand factor (VWf)-cleaving protease ADAMTS13 (A Disintegrin And Metalloproteinase with a ThromboSpondin type 1 motif, member 13). Mixed connective tissue disease (MCTD) is an overlap syndrome that has clinical features of systemic lupus erythematosus, systemic sclerosis, and polymyositis and is associated with anti-U1 ribonucleoprotein (RNP) antibodies. TTP in association with MCTD has been rarely described. This paper describes a rare case of TTP in a 41-year-old male patient diagnosed with MCTD fourteen years ago and now presenting with thrombocytopenia, microangiopathic haemolytic anemia (MAHA) and neurological abnormalities. A diagnosis of TTP was confirmed with decreased ADAMTS13 activity with high ADAMTS13 antibody titres. He was initially treated with PLEX with quick reversal of hematologic and neurologic abnormalities but had a relapse of thrombocytopenia two days after PLEX was stopped. He was retreated with PLEX and high dose prednisone and had normalization of his platelets with no further relapse. In acquired TTP, the deficiency of ADAMTS13 is due to IgG inhibitory anti-ADAMTS13 antibodies that develop transiently and tend to disappear during remission. ADAMTS13 antibodies have been detected in 48 to 80% of patients with acquired TTP. Autoantibodies to

ADAMTS13 in patients with severely low ADAMTS13 activity (<10%) have been associated with greater relapse rates and lower survival rates. Treatment options include plasma exchange (PLEX), steroids and rituximab, although randomized controlled trials in this area are limited. ADAMTS13 activity and antibody titres are rarely reported in previous literature of patients with TTP and MCTD. In those patients that did have enzyme activity and titres tested, antibody levels were undetectable and all three patients died despite treatment with PLEX and steroids. The patient in this case study had low ADAMTS13 activity and high ADAMTS13 antibody titres and went into remission after treatment with PLEX and high dose steroids.

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Toward the Definition of Low Disease Activity in Systemic Lupus Erythematosus

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Objectives: Remission is a desirable but not common outcome in SLE and therefore additional outcome measures are needed to evaluate new therapies. Our aims were: 1) to define and identify a group of SLE patients with low disease activity (LDA) being followed in a prospective cohort study, 2) to examine whether the LDA group was similar to a remission group, 3) to discern whether these 2 groups were different from a high disease activity group (HDA) in short term outcomes.

Methods: The study population included patients with SLE who were followed according to a standard protocol from 1970 to 2015 and who had visits no more than 18 months apart. The LDA group was defined as Systemic Lupus Erythematosus Disease Activity Index (SLEDAI-2K) <3 (with or without positive serology) according to the presence of only 1 clinical manifestation of: rash, alopecia, mucosal ulcers, pleurisy, pericarditis, fever, thrombocytopenia or leukopenia. The patients could be taking antimalarial. The remission group was defined as no clinical manifestation on antimalarial alone. The HDA group was defined as SLEADI-2K>6. The time frame for inclusion in each group was at least 1 year.

Results: Of 620 patients with active disease who were seen during this period 80 (12.9%) patients fulfilled the criteria for LDA, 191 (30.8%) for remission and 349 (56.3%) for HDA. The LDA patients with positive serology (30 patients) were similar to the LDA patients without serology (50 patients) in baseline and prior disease manifestations, co-morbidities, treatments and in the distribution of the defined SLEDAI-2K items at baseline. After 2 years of follow-up, (from the end of the definition year) the LDA and remission groups were similar in their adjusted mean SLEDAI (AMS) score, organ involvement, SLICC score, higher mortality and use of therapies. After 2 and 4 years of follow up (from the definition year), The HDA group had higher AMS, more major organ involvement, higher SLICC score, more mortality and was given more treatments compared to the LDA and remission groups.

Conclusion: SLE patients with LDA were defined and identified in a large SLE cohort. The LDA and remission groups had similar short term outcomes and both had better outcomes and prognosis than the HDA group. LDA may be used as an outcome measure in therapeutic trials or in treat to target regimens.

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Retention Rate of TNF Inhibitors (TNFi) in Ankylosing Spondylitis (AS) Patients from the Rhumadata Clinical Database and Registry

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Objectives: TNF-inhibitors have demonstrated great efficacy in clinical trials in AS patients and were rapidly adopted to treat patients with persistently active disease. More information is needed regarding the performance of these drugs in rheumatology ambulatory care over the long-term (≥ 5 years). Previous studies show good efficacy even after switching to another TNFi. A nationwide registry reports a longer than 4-year retention rate of TNFi in close to 60% of men. Our objective is to evaluate the retention rate of TNFi in AS patients in primary or secondary intention in a real-world setting. Our previous analysis (ACR 2014) did not show any significant difference in retention rates for adalimumab, etanercept and infliximab. Golimumab has been added to this analysis.
Methods: Data of 431 AS patients TNFi exposed after March 1st, 2001 was extracted. Data included demographics, disease and therapy characteristics. Assessment of disease activity, including BASDAI, BASFI and ASDAS, were calculated at baseline, 3 months after therapy initiation and at every medical visit thereafter. All patients were followed until they discontinued their treatment or until October 1st, 2015, the date of data extraction. Drug retention rates were estimated and compared using Kaplan-Meier survival estimates (SAS version 9.4).
Results: Patients were mostly men (65.2%) and had an average age of 41.8 (SD=11.7) at treatment initiation. 76.6% were HLA-B27 positive. Average disease duration is 7.5 years (SD=9.4). Mean TNFi exposition is 3.5 years (SD=3.2). 300 AS patients were exposed to one TNFi and 89 to two agents. Baseline demographics and disease characteristics were similar among those treated in primary or secondary intention. At 6 years, the retention rates of TNFi used in primary intention was 68.4% (SE=5.0%) for Adalimumab, 52.3% (SE=6.3%) for Infliximab, 54.0% (SE=7.2%) for Etanercept, and 54.0% (SE=9.1%) for Golimumab (Overall log-rank p-value =0.0810). However, at 5 years, the retention rates of TNFi used in secondary intention was 27.4% (SE=8.2%) for Adalimumab, 52.0% (15.7%) for Infliximab, 53.7% (SE=12.0%) for Etanercept, and 27.3% (SE=13.4%) for Golimumab (Overall log-rank p-value =0.2629).
Conclusion: In this real-world setting, the six years TNFi retention rate is statistically similar between those 4 agents although adalimumab is numerically superior. In second intention, in a smaller sample, no statistically significant differences were found between any of these agents.

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Pregnancy & Parenting with Arthritis: Bridging the Information Gap

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Objectives: Arthritis affects many aspects of an individual's life including their decisions regarding pregnancy and in carrying out their role as a parent. As a result, the Canadian Arthritis Patient Alliance (CAPA) launched a project on pregnancy and parenting. The first phase of the project involved the development of a survey to identify the information needs of people living with arthritis and their network of support (e.g. spouse/partner, health care team). This was identified as a CAPA priority as there is a lack of complete and readily available information to assist people living with arthritis during pregnancy and in carrying out their role as a parent. We will present the survey's development throughout 2015, its subsequent launch in time for September's Arthritis Month and the survey results.
Methods: One Board member acted as project manager and obtained feedback on the survey from various people living with inflammatory arthritis who represented a range of perspectives (e.g. considering pregnancy, parenting school age children, etc.). Methods to achieve this

feedback included phone calls, in person meetings and email. A survey that included all feedback was created on Survey Monkey (in both English and French), published on the CAPA website (http://www.arthritispatient.ca/projects/pregnancy-parenting/ and communicated through the CAPA newsletter and other forms of social media. Subsequent distribution and promotion of the survey were achieved through CAPA's efforts and partnership with various stakeholders throughout September and October 2015.
Results: A survey on pregnancy and parenting was created with input from people living with arthritis. It was launched in September 2015 and publicized by stakeholder networks (e.g. newsletters, social media, websites). The survey responses (>80) will be summarized in this presentation and will influence the development of an educational resource for people living with arthritis.
Conclusion: CAPA created and launched a pregnancy and parenting survey to identify information needs. The next stage of the project is to create an educational resource to provide information, identify common issues and provide tips and resources for people living with arthritis (and their support networks) for pregnancy and in carrying out their role as a parent. CAPA aims to raise the profile of this issue and help people living with arthritis engage in more dialogue with their healthcare providers during these critical life events.

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Comparative Clinical and Cost Analysis of Surgical and Non-Surgical Intervention for Osteoarthritis of the Knee

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Objectives: The primary aim of this study is to compare clinical outcomes and costs associated with surgical and non-surgical intervention for Osteoarthritis of the Knee (OAK). Because a significant proportion of Canadians are affected by OAK, the impact on health care resources warrants evaluation of currently accepted approaches for management of this condition and the impact of focused programs on OAK care.
Methods: We performed a two year retrospective chart review of patients who attended our Multidisciplinary OA program. We selected those with baseline radiographs demonstrating moderate to severe knee OA as defined by expert musculoskeletal radiologists who interpret all the X rays of our program patients (utilizing standard validated techniques-joint space narrowing, osteophytes and deformity). The majority had also been referred by the orthopedic service and considered as potential arthroplasty candidates. Age, gender, BMI , and Western Ontario and McMaster Arthritis Index (WOMAC) scores were recorded at each visit. All investigations and treatment employed (surgical and. non-surgical) were documented and their costs tabulated for each patient. A univariate analysis of the change in WOMAC scores (initial vs. final visit) was determined.
Results: 376 charts were reviewed from 2013-2015, and 131 met criteria for moderate to severe OA. At baseline, 63% had a WOMAC score of greater than 39 (range 7-69). Average change in WOMAC scores over the 24 month follow up was a reduction of 8.44 (range -40-0). 5/ 131 (3.8%) proceeded to knee arthroplasty during the 24 month follow up. Average surgical costs (preoperative, operative and postoperative expenses) for these 5 patients totaled $10, 476.53 /pt. Average cost of medical management was $925.43/pt. This represents an average net savings of $9,551.10/pt for those who receive medical intervention alone.
Conclusion: These results infer that a multidisciplinary medical program for the management of

OAK can improve symptoms, quality of life and function while providing substantial cost savings, at least during this 2 year time frame and potentially longer. This approach also facilitates and prioritizes the optimal pathways for those individuals who would most benefit from arthroplasty, while improving the delivery of medical management and avoidance of surgical intervention in a very large number of patients with OAK.

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Baricitinib, an Oral Janus Kinase (JAK)1/JAK2 Inhibitor, in Patients with Active Rheumatoid Arthritis (RA) and an Inadequate Response to TNF Inhibitors: Results of the Phase 3 RA-BEACON Study

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Objectives: In ph 2 studies, baricitinib (bari) improved disease activity with an acceptable safety profile in patients (pts) with active RA naïve to biologic DMARDs (bDMARDs).1,2 The objective was to report results from a ph 3 study of bari in pts with active RA and an inadequate response or intolerance to ≥1 TNF inhibitor (TNFi).

Methods: Pts with active RA (TJC & SJC ≥6, hsCRP ≥3mg/L) on conventional DMARDs (cDMARDs) were randomized 1:1:1 to placebo (PBO) or bari (2 or 4 mg) QD for 24 wks. All bDMARDs were discontinued ≥28d prior to treatment. Primary endpoint was ACR20 response at Wk 12 for bari 4 mg vs. PBO.

Results: Of 527 randomized pts, 57% had received ≥2 bDMARDs and 38% had received ≥1 non-TNFi bDMARD. Fewer pts discontinued treatment prior to Wk 24 on bari 2 or 4 mg vs. PBO (10%, 11%, 18%, respectively). ACR20 response at Wk 12 was higher with bari 4 mg vs. PBO (55% vs. 27%, p≤0.001). Improvements in ACR20, ACR50, ACR70, DAS28, CDAI, SDAI, and HAQ-DI were seen, many as early as Wk 1. Treatment benefit was sustained through Wk 24 for the 4 mg dose. More TEAEs occurred in pts receiving bari 2 or 4 mg compared to PBO (71%, 77%, %, respectively) including infections (44%, 40%, 31%, respectively). SAE rates through 24 wks were similar among pts receiving bari 2 or 4 mg or PBO (4%, 10%, and 7%, respectively) including serious infections (2%, 3%, and 3%, respectively). There were no opportunistic infections, TB, or GI perforations. Two non-melanoma skin cancers and 2 major adverse cardiovascular events, including 1 death (stroke), were seen with bari 4 mg. Lab findings were consistent with ph 2 studies. Abnormalities leading to discontinuation were infrequent.

Conclusion: In pts with active RA on cDMARDs and an inadequate response to bDMARDs, once daily oral bari was associated with rapid and sustained clinical improvements through 24 wks, with an acceptable safety and tolerability profile. The largest benefit was seen with the 4 mg dose. Additional ph 3 studies in bDMARD-naive pts are ongoing. 1Keystone et al. Ann Rheum Dis 2015; 74:333-340, 2Tanaka et al. Arthritis Rheum 2013; 65(S10):S765359.

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Baricitinib, an Oral Janus Kinase (JAK)1/JAK2 Inhibitor, in Patients with Active Rheumatoid Arthritis (RA) and an Inadequate Response to cDMARD Therapy: Results of

the Phase 3 RA-BUILD Study

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Objectives: In ph 2 studies, baricitinib (bari) improved disease activity with an acceptable safety profile in patients (pts) with active RA and inadequate response (IR) to conventional DMARDs (cDMARDs). The objective was to report results from a 24-week (Wk) global ph 3 study of bari in pts with active RA and an IR or intolerance to ≥1 cDMARD.

Methods: Pts with active RA (TJC & SJC≥6 & hsCRP≥3.6 mg/L) with stable background treatment were randomized 1:1:1 to placebo (PBO) or bari (2 or 4 mg) QD, stratified by region and baseline joint erosion status, with rescue from Wk 16 for nonresponders. Primary endpoint was ACR20 response at Wk 12 for bari 4 mg vs. PBO.

Results: Of 684 randomized pts, 81% were seropositive with mean baseline DAS28 of 5.55 (-hsCRP) and 6.22 (-ESR). Rescue rates were 9%, 7%, and 24% for bari 2 mg, 4 mg, PBO, respectively. ACR20 response at Wk 12 was 62% with bari 4 mg vs. 40% with PBO ($p \leq 0.001$). Improvements in ACR50, ACR70, DAS28, CDAI, SDAI, and HAQ-DI were seen, many as early as Wk 1. Change in mTSS at Wk 24 was lower with bari 2 or 4 mg vs. PBO ($p \leq 0.05$, $p \leq 0.01$, respectively). TEAE and SAE rates, including serious infections, were similar among pts receiving bari 2 or 4 mg or PBO (SAEs: 3%, 5%, 5%, respectively). There were no GI perforations or opportunistic infections. In the bari 4mg group, 1 TB case and 1 NMSC case occurred. In the PBO group, 2 deaths and 2 MACE occurred. Lab findings were similar to ph 2; few abnormalities led to discontinuation.

Conclusion: Once daily oral bari was associated with rapid and sustained clinical improvement and inhibition of radiographic joint damage, with an acceptable safety and tolerability profile. The most robust benefit across measures was seen with the 4 mg dose.

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Process Evaluation of "Employment & Arthritis: Making it Work", An Online Program to Help People with Inflammatory Arthritis Maintain Employment

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Objectives: Work disability and decreased work productivity are common in inflammatory arthritis (IA), yet few services for people with IA address employment issues. We report on a process evaluation of the "Employment and Arthritis: Making it Work" program, an online self-management program to help people with IA deal with employment issues, prevent work disability and improve at-work productivity.

Methods: We performed a process evaluation of the "Making it Work" program during a

randomized controlled trial testing its effectiveness. The program consists of five self-learning e-modules; five on-line group meetings conducted using webinar-like technology with video, on weekday evenings and led by a vocational rehabilitation counsellor (VRC); followed by one-on-one meetings with an occupational therapist (OT) for an ergonomic work assessment and with a VRC. Participants were recruited from rheumatology practices, arthritis outpatient programs and advertisements. Eligibility criteria include: having IA, currently employed, age 18-59, concerned about their ability to work, with access to a computer. We report on all subjects randomized to the program who participated prior to September 1st 2015. Data were collected using online questionnaires, e-learning activity tracker and by study personnel.
Results: The sample includes 84 participants [77% female, mean(SD) age: 48(9.4) years, disease duration: 10(8.9) years; with RA (54%), AS (19%), psoriatic arthritis (14%) or SLE (13%); 92% from British Columbia]. Group meetings were successfully conducted online and interactive activities performed as planned, with minimal technical difficulties and good group cohesion according to the experienced facilitator. Overall, participation rate was fair. Median (25Q;75Q) number of online group meetings attended was 4 (3;5), with 68% of participants attending 4 or 5 meetings, and attendance being highest in the first (92%) and lowest in the fifth (63%) meetings. Sending reminders improved attendance, with 81% of participants sent two reminder emails prior to each meeting attending 4 or 5 meetings, compared to 60%. Completion of OT and VRC assessments were 85% each. Median (25Q;75Q) completion of e-learning modules (% of total slides viewed) was 70% (45%;93%). Reasons for not attending meetings included technological difficulties, family commitments, work obligations, other time constraints, or health issues.
Conclusion: Overall, our process evaluation shows that the online format of the "Making it Work" program is feasible and lends itself well to interactive activities amongst participants, a valued component of self-management programs. Participation in group meetings and completion of self-learning modules was fair, limited by competing time demands, and improved by measures such as sending frequent electronic reminders.

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Retrospective Study of Osteoporosis Management in Patients with Fragility Hip Fracture During Hospitalization in an Acute Care Setting

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Objectives: Fractures and other complications associated with osteoporosis cause significant impediment to quality of life and are extremely costly to the Canadian healthcare system. Long established in our institution is a “shared care model” between Divisions of Orthopedics and Rheumatology for co-managing patients with fragility fracture. Without a standardized protocol for identifying and treating osteoporosis in this high risk population, we hypothesize care gaps in starting secondary prevention within the acute care musculoskeletal (MSK) unit. The goal of this study is to identify baselines for: 1) diagnosing osteoporosis or fragility fracture, 2) initiating bone health pharmacological agents and 3) arranging follow-up for bone health in patients with fragility hip fracture.
Methods: A retrospective chart review was conducted on 122 patients with a hip fracture

requiring surgical intervention between June to December 2014. Prescription history was extracted from the Ontario Drug Benefit database (Drug Profile Viewer) for assessing adherence of bone health pharmacological agent 6 month post-fracture.
Results: Of the 122 cases reviewed, 117 (96%) were fragility fractures. Mean age of patients with fragility hip fracture was 82.0 years (SD 9.88) with 68% female. Approximately a quarter (22%) were taking osteoporosis medication on admission (92% oral bisphosphonate, 8% denosumab). The same pharmacological agent was re-ordered on MSK unit for all, with the exception of 2 cases where the possibility of atypical fracture was discussed. Almost all patients (92%) received rheumatologist consultation, with the following osteoporosis specific interventions made: osteoporosis diagnosed (55%), previous BMD result requested (6%), BMD testing recommended (9%), follow up regarding osteoporosis arranged (9%), and osteoporosis medication initiated in 43% of treatment naïve patients. Based on prescription fill data from Ontario Drug Benefit database, 68% patients who had osteoporosis medication initiated during hospitalization adhered to it 6 months post-fracture, whereas a mere 17% were using osteoporosis medication 6 months post-fracture when it was not initiated in the acute care unit.
Conclusion: High degree of collaboration was seen between rheumatology and orthopedics in fragility hip fracture management. While inconsistency was noted in diagnosing osteoporosis, the in-hospital pharmacological agent initiation rate of 43% was considerably higher than stated in literature. Moreover, results showed that initiation of a pharmacological agent during hospitalization leads to a much greater likelihood of adherence 6 months post-fracture. Next steps: we will initiate an osteoporosis/fragility fracture standardized order set, with plans to conduct further study to draw comparisons with the baseline data obtained.

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Evaluating Inter-Rater Reliability in Joint Count to Promote Quality and Trust in a Clinical Arthritis Care Team

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Objectives: Joint count assessment is essential for the diagnosis and ongoing evaluation of Rheumatoid Arthritis (RA) disease activity. In our team based, interprofessional approach to arthritis care, the attending rheumatologist must be able to trust the joint count of fellow rheumatologists and allied health care providers (AHPs). Congruency and accuracy in joint count is imperative for effective collaboration to occur. Inter-rater variability in assessing tender and swollen joint counts has been well documented, especially with a lack of consistency in swollen joint count (SJC), (ICC range 0.29 to 0.95)1. As part of continuous quality improvement, we undergo annual joint count intervalidation. In the spring of 2015, a joint count intervalidation event was held with all team members who routinely perform joint counts. Aim of this study was twofold: 1) to estimate the agreement between team members, and 2) to provide training for standardizing joint count assessments.

Methods: Ten assessors (4 rheumatologists, 2 physical therapists, 3 occupational therapists, 1 kinesiologist) and six patient volunteers with RA (2 diagnosed within past 12 months, 4 have longer term disease) attended the intervalidation session. Assessors were instructed to be as objective as possible, by neglecting the historical comparison of joint status, and to measure counts based on swollen vs. not swollen. All assessors and patient volunteers attended a debrief session afterwards when SJCs were compared and assessment techniques were discussed. A survey was administered to both assessors and patients to gather their feedback.
Results: Overall, inter-rater reliability between the ten assessors on SJC for the six RA patients was moderate (ICC: 0.51, 95% CI: 0.30-0.91). Nonetheless, post-event questionnaires revealed that 100% of the rheumatologists and AHPs agreed or strongly agreed that intervalidation was a critical quality assurance initiative and a collaborative process for learning. All four rheumatologists reported increased confidence to co-manage RA patients with AHPs after attending the session.
Conclusion: This is a unique quality assurance initiative designed to foster trust amongst a large interprofessional arthritis care team. In the framework of shared care and treat to target approaches, joint count intervalidation within networks of arthritis care providers may be valuable. Further research is necessary to identify opportunities to improve inter-rater agreement and more fully understand how assessor and patient-level factors may contribute to these findings. 1Cheung PP. et al: Reliability of joint count assessment in rheumatoid arthritis: A systemic literature review. Semin Arthritis Rheum 2014; 43:721-9

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To Evaluate the Drug Survival Analysis of First Non-TNF Biologic Agents in Rheumatoid Arthritis Patients

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Objectives: To compare different drug survival duration of first non-Tumor Necrosis Factor (TNF) inhibitors biologic agents in rheumatoid arthritis patients
Methods: Tocilizumab, Abatacept and Rituximab use among rheumatoid arthritis patients who is taking their first non-anti-TNF inhibitors in a community rheumatology clinic in Ontario, Canada. The start and stop dates for each biologic from the medication being available in Canadian market to August 1st, 2015 was recorded. The median drug survival, age and reasons for discontinuation were compared. The ESR, CRP, DAS28ESR, number of tender joints and the number of swollen joints at the beginning of the drug intake was recorded. The mean reduction in ESR, CRP, the number of tender joints and the number of swollen joints for this time period was calculated.
Results: 142 patients were included, 83% female (average age 58). 62 patients used Tocilizumab (44%), 56 patients used Abatacept (39%) and 24 patients used Rituximab (17%). The median drug survival for Tocilizumab was 728 days, Abatacept was 382 days and Rituximab was 487 days. Discontinuation rate were 47 % Tocilizumab (29/62), 43% Abatacept (24/56), 38% Rituximab (9/243). 59%, 91% and 66% of patients discontinued Tocilizumab, Abatacept and Rituximab respectively due to lack of efficacy. The average reduction in ESR for 53 Tocilizumab users was 24.81 and for 20 Rituximab users was 18.55. 50 Abatacept users had a mean ESR increase of 1.41. The average reduction in CRP for 42 Tocilizumab users was 9.41, for 47 Abatacept users was 4.51 and for 18 Rituximab users there was a mean increase of 1.87. The average reduction in DAS28-ESR for 31 Tocilizumab users was 2.66, 27 Abatacept users

was 1.81 and 7 Rituximab users was 0.985. The average reduction in the number of swollen joints for 48 Tocilizumab and 44 Abatacept users was 6 and for 19 Rituximab users was 2. The average reduction in the number of tender joints for 49 Tocilizumab users was 11, for 43 Abatacept users was 8 and for 19 Rituximab users was 2.
Conclusion: The median drug survival in the Tocilizumab group was higher than the Abatacept and Rituximab group. Lack of efficacy was the greatest reason for decreased drug survival in all three drugs. Tocilizumab had the greatest mean reduction in patient ESR levels, CRP levels, DAS28-ESR levels and the greatest average reduction in the number of swollen and tender joints.

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Effectiveness and Safety of Golimumab in the Treatment of Psoriatic Arthritis over a 12 Month Period

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Objectives: The efficacy and tolerability of golimumab (GLM) in patients with psoriatic arthritis (PsA) has been demonstrated in several controlled clinical trials. Longitudinal observational studies assessing the real-life effectiveness of anti-TNF agents are essential to demonstrate true population-based benefits. The objective of this analysis was to assess the 12-month outcomes in PsA patients treated with GLM in Canadian routine clinical practice.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, ankylosing spondylitis, or PsA with infliximab or GLM. Eligible participants for this analysis included PsA patients treated with GLM enrolled since 2010. Descriptive statistics were produced for clinical outcome measures and patient reported outcomes over 12 months. Within-group changes were assessed for statistical significance with the paired-samples Student's t-test and the McNemar test. Safety was assessed with the incidence of adverse events (AEs)/100 patient-years.
Results: There were 151 patients included in this analysis with a mean (SD) age of 51.3 (13.4) years and a disease duration since diagnosis of 4.3 (5.0) years. The proportion of males and females was even (50%). Six-month and 12-month follow-up was available for 109 (72.2%) and 69 (45.7%) patients, respectively. Upon six months of treatment, statistically significant and clinically meaningful improvements were observed for all disease parameters and were sustained over 12 months of treatment (Morning stiffness, SJC, TJC, Pain, PtGA, MDGA, HAQ, PASI, DAS28-CRP). The proportion of patients with minimal disease activity (MDA) was 9.8% at baseline, 52.1% at 6 months, and 50.0% at 12 months. The prevalence of enthesitis decreased from baseline to 12 months from 27.8% to 18.8% (P=0.791), while a considerable decrease was observed for dactylitis from 27.8% to 2.9% (P<0.001), respectively. The incidence of new enthesitis cases and new dactylitis cases at 12 months was 11.1% and 1.9%, respectively. A total of 216 AEs (172.6 events/100 patient-years) were reported by 78 (51.7%) patients and 22 serious AEs (SAEs) (17.6 events/100 patient-years) by 12 (7.9%) patients. The incidence of

serious infections and malignancies were 4 (3.2 events/100 patient-years) and 5 (4.0 events/100 patient-years), respectively. There was one death reported during the course of the study judged as not related to GLM by the treating physician.
Conclusion: The results of this study have shown that a significant burden of illness is observed at GLM initiation in PsA patients. Treatment with GLM was well tolerated and effective in reducing symptom severity and improving disease outcomes in PsA patients over 12 months.

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What Proportion of Patients with PsA Fail to Achieve MDA Based on Patient Reported Outcomes? An Analysis from a Prospective, Observational Registry

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Objectives: Recent treat-to-target guidelines in PsA recommend that minimal disease activity (MDA) is achieved as early as possible. Patient reported outcomes (PROs) have been criticized for not accurately assessing PsA disease activity as they may reflect aspects not directly related to PsA such as fibromyalgia, depression or other comorbidities. The aim of this analysis was to assess the proportion of patients failing to achieve MDA based on PROs in a real-world, routine clinical care setting in Canada.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, ankylosing spondylitis, or PsA with infliximab (IFX) or golimumab (GLM). Eligible participants for this analysis included those with PsA treated with IFX who were enrolled since 2005 or with GLM enrolled since 2010 and with available MDA information at baseline, 6 months, and/or 12 months. MDA was defined as the fulfillment of ≥5 of the following criteria: TJC28≤1, SJC28≤1, PASI≤1, pain (VAS)≤15 mm, PtGA (VAS)≤20 mm, HAQ≤0.5, tender entheseal points ≤1. Near MDA was defined as fulfillment of 4 criteria.
Results: A total of 196 PsA patients (51.4% male) were included with a mean (SD) age of 49.8 (11.1) years and disease duration since diagnosis of 5.4 (6.3) years. The majority (62.2%) received concomitant DMARD therapy. The proportion of patients with MDA at baseline, 6 months and 12 months was 11.7%, 43.5%, and 44.8%, respectively. Overall, achievement of each individual MDA criterion was: TJC28: 43.0% of cases; SJC28: 51.3%; PASI 68.7%; pain: 27.7%; PtGA: 34.9%; HAQ: 36.8%; entheseal points: 79.4%. Among the 309 instances of non-MDA, 51 (16.5%) were near MDA cases. The most common reason for non-MDA in near MDA cases was patient-reported pain (82.4%) followed by PtGA (68.6%), and HAQ-DI (60.8%). Assuming that these criteria were met (i.e., not included in the MDA formula), the total number of MDA instances would increase from 29.6% to 36.7% (HAQ), 37.6% (PtGA), and to 39.2% (pain).
Conclusion: The results of the current analysis have shown that, similar to prior analyses in RA, the most common limiting factors in achieving MDA in PsA are PROs, including PtGA, pain, and HAQ-DI, accounting for as many as 82.4% of near MDA cases. Further analyses are

required to identify the determinants of the differences in PROs and clinical outcomes.

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Regional Variability of Minimal Disease Activity among Psoriatic Arthritis Patients in Canada: An Analysis from the Prospective, Observational Registry, BioTRAC

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Objectives: Although remission remains the ultimate treatment goal in psoriatic arthritis (PsA) management, minimal disease activity (MDA), which encompasses remission and low disease activity, constitutes an attainable goal. Given that variability may exist across Canadian provinces both in regard to patient characteristics at anti-TNF initiation and in PsA management in routine clinical practice, the aim of the current analysis was to assess the regional variability in MDA achievement among Canadian patients initiating treatment with anti-TNF in real-world.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for PsA, ankylosing spondylitis, or rheumatoid arthritis with infliximab or golimumab. PsA patients who were enrolled during 2002-2015, had ≥1 follow-up assessment and MDA data available were included. MDA was defined as the fulfillment of ≥5 of the following criteria: TJC28≤1, SJC28≤1, PASI≤1 or BSA≤3, Pain (VAS) ≤15mm, PtGA (VAS) ≤20 mm, HAQ≤0.5, tender entheseal points ≤1. Provinces were regrouped by region: Western (Alberta, British Columbia, and Saskatchewan), Ontario, Quebec and Maritimes. Continuous and categorical variables were assessed with the non-parametric Kruskal-Wallis test and the Chi-square test, respectively.

Results: 223 PsA patients (51.4% male) were included in the analysis. The mean (SD) age was 49.8 (11.1) years, and disease duration was 5.8 (6.6) years. The proportion of patients in BioTRAC by Canadian region was 6.4%, 50.5%, 29.7% and 13.4% for the Western region, Ontario, Quebec and the Maritime region, respectively. The mean (SD) disease duration was significantly different among regions with [Western: 5.00 (5.48), Ontario: 5.76 (6.51), Quebec: 7.47 (7.60), Maritimes: 1.8 (1.9) years; p=0.027]. Baseline disease parameters for TJC, SJC, pain, PtGA, and HAQ-DI were statistically comparable at baseline among Canadian regions. However, significant between-group differences were observed at baseline for mean (SD) enthesitis count [Western: 7.00 (4.21), Ontario: 1.14 (2.90), Quebec: 1.33 (2.14), Maritime: 3.16 (3.88); p<0.001], and PASI [Western: 4.76 (4.98), Ontario: 3.71 (5.51), Quebec: 1.45 (2.94), Maritime: 1.18 (1.32); p=0.001]. At baseline, 6 and 12 months of treatment, 11.7%, 43.5%, and 44.8% of patients achieved MDA, respectively. A statistical trend was observed between regions with respect to MDA achievement at 6 or 12 months of treatment (p=0.127). Ontario and Quebec patients had the highest MDA rates (55.9% and 52.1%), while 44.4% and 18.2% of patients in Maritime and Western provinces presented with MDA, respectively.

Conclusion: MDA achievement rates vary across Canada which could be attributed to differences in the patient profile and in disease duration at anti-TNF initiation.

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The Impact of Disease-related and Contextual Factors on Work Outcomes in Chronic Inflammatory Arthritis Patients Treated with Biologics: A Systematic Review

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Claire Bombardier (University of Toronto, Toronto)
Objectives: Objective: Biological therapy has been shown to have a positive effect on work outcomes, such as work participation and/or work disability in patients with chronic inflammatory rheumatic diseases. However, work outcomes are often dependent on contextual factors. Our objective is to specifically identify both the disease-related and contextual factors that impact work outcomes in patients with chronic inflammatory arthritis treated with biologics.
Methods: Methods: A systematic literature search was conducted using the Medline, Embase, two Cochrane, and CINAHL databases as well as hand searches from conference archives and clinicaltrials.gov to identify publications relating to chronic inflammatory rheumatic diseases (specifically rheumatoid arthritis (RA), ankylosing spondylitis (AS), psoriatic arthritis (PsA), systemic erythematous lupus, Sjogren's syndrome, or systemic sclerosis) in double-blind, randomized-controlled biological therapy trials with work outcomes as a primary or secondary outcome. Only studies that describe a relationship between either a disease-related or contextual (CoFas) factor and work outcome were included. A critical appraisal of the included studies was performed to determine methodological flaws in the study design and to assess for possible bias.
Results: Results: Of the 19 abstracts retrieved, 13 studies met inclusion criteria. The RCT's included 3 chronic inflammatory diseases (AS= 3, PsA =2, RA = 8). The follow-up period was between 12 weeks to 2 years. Biologics used include etanercept (4 studies), infliximab (3 studies), adalimumab (3 studies), and single studies with golimumab, abatacept, and certolizumab pegol. Despite study heterogeneity, there was an overall positive effect of biological therapy on work outcomes. Disease-related factors which correlated with work outcomes included patient-reported outcomes such as the health assessment questionnaire (HAQ) in 7 studies, fatigue in 3 studies, and pain in 2 studies, as well as specific disease activity and remission markers. Only 5 studies examined contextual factors. Specifically, personal factors such as female gender (3 studies) and older age (4 studies) had a negative impact on work outcomes. Environmental factors that correlated with better work outcomes include non-manual type of jobs, higher baseline number of hours worked, and lower baseline number of sick days.
Conclusion: Conclusions: Our results show that the positive effect of biological therapy on work outcomes is likely a result of interplay between better disease control as well as favorable patient and work environment contextual factors. Further trials identifying these variables will be important for the evaluation and prediction of work outcomes in RCT's with biological therapy for patients with chronic inflammatory diseases.

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Solid-phase, ELISA-based and Indirect Immunofluorescence Assays: Is the Gold Standard Worth its Weight in Gold?

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Objectives: Indirect immunofluorescence (IFA) is considered the gold standard for antinuclear antibody (ANA) testing. Its high sensitivity, however, is offset by its high cost, operator-dependence, and poor specificity, with low IFA titres present in 30% of healthy controls, relative to newer, solid-phase ELISA-based assays. For clinicians, who navigate the complex, often conflicting roles of patient advocates and resource managers, understanding the practical utility of each assay would be a boon to their practice, and is unknown. In this study, we explored the clinical significance of discordant ANA IFA and a multiplex solid-phase immunoassay (Bioplex)

results in rheumatology patients at an academic teaching hospital.
Methods: Patients tested simultaneously with IFA and Bioplex assay between May 1, 2011 and April 30, 2012, with discordant results (i.e., ANA+/Bioplex- or ANA-/Bioplex+) were identified in the University Health Network's laboratory database. Patients' electronic medical records were reviewed to determine whether the patient had connective tissue disease (CTD) (subdivided into those meeting classification criteria and those with incomplete – but clinically suggestive – presentations) at time of discordant results until their most recent visit. Longitudinal clinical details, autoantibody and medication profiles and alternate etiologies for ANA positivity were abstracted into an electronic database using a standardized protocol. ANA IFA titre ≥1:80 was considered positive. Descriptive statistics were used.
Results: 286 discordant results were discovered among 1206 patients with simultaneous IFA/Bioplex measurement (24%). Of these, 230 were rheumatology patients, whose charts were reviewed in detail. 160 patients were IFA+/Bioplex- and 70 were IFA-/Bioplex+. Of the former group, the negative Bioplex result was clinically concordant in 39 (24%), reflecting an absence of autoimmune disease, despite IFA positivity (with titres up to >1:0). In the IFA-/Bioplex+ group (n=70), Bioplex was clinically concordant in 61 patients (87%); of these, 62% had established CTD that met accepted classification criteria. IFA sensitivity and specificity at the time of the discordant result was 67% and 19%, and Bioplex was 34% and 81%, respectively compared to the clinician's overall impression. The Bioplex result reflected the patient's clinical presentation in 100 of the 230 patients reviewed (43%).
Conclusion: Among patients with simultaneously discordant ANA results by IFA and Bioplex assay, we corroborated the trade-off between sensitivities and specificities in this subset. IFA screen remains useful in the setting of moderate pretest probability, but given false negative results observed in some patients with established CTD, these tests should not be repeated once positive, as they add no clinical value.

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Variability in Health Assessment Questionnaire Based on Type of Health Insurance Coverage and Rheumatology Practice

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Objectives: Previous studies in rheumatoid arthritis (RA) have shown that patient socioeconomic status (SES) impacts patient prognosis. We hypothesized that public vs. private healthcare coverage would be a surrogate of low SES. The aim of this analysis was to assess the association between patient health insurance coverage and disease parameters with emphasis on functional activity in RA patients initiating treatment with anti-TNF agents in Canadian routine clinical practice.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, ankylosing spondylitis, or psoriatic arthritis with infliximab (IFX) or golimumab (GLM). Eligible people for this analysis included RA patients treated with IFX who were enrolled since 2002 or with GLM enrolled since 2010. Independent predictors of HAQ were identified using

generalized linear models.
Results: A total of 1144 patients were included of whom 598 (52.3%) had public insurance. Patients with public insurance were older (59.7 vs. 51.8 years; P<0.001), had longer disease duration (9.3 vs. 7.5 years; P=0.029), and were more likely to be from British Columbia (81.2% vs. 18.8%) and Manitoba (68.8% vs. 31.3%) but less likely to be from the Maritimes (30.6% vs. 69.4%) (P<0.001). With respect to disease activity, patients with public insurance had higher CDAI (37.3 vs. 30.3; P<0.001), DAS28 (6.0 vs. 5.2; P<0.001), swollen joint count (11.0 vs. 8.5; P<0.001), tender joint count (12.8 vs. 10.3; P<0.001), patient global (62.1 vs. 55.5; P<0.001), and HAQ (1.74 vs. 1.36; P<0.001). Multivariate analysis adjusting for age (P=0.028), gender (P<0.001), anti-TNF agent (P=0.227), and CDAI (P<0.001) showed that private insurance type was a significant independent predictor of lower HAQ (1.28 vs. 1.52; P<0.001). Furthermore, rheumatology practice was also identified as a significant predictor of HAQ (P=0.027).
Conclusion: The results of this analysis suggest that, upon adjusting for patient demographics and disease activity, significant variation exists in the HAQ score based on the type of health insurance coverage and the rheumatology practice which may reflect differences inherent to the patient SES or to the manner of administration of the HAQ instrument.

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Air Pollution and the Rheumatic Diseases: A Systematic Review and Meta-Analysis

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Objectives: Environmental risk factors, such as air pollution, have been studied in relation to the risk of development of rheumatic diseases, including rheumatoid arthritis (RA), systemic autoimmune rheumatic diseases (SARDs), vasculitis and juvenile idiopathic arthritis (JIA). A systematic literature and meta-analysis was performed to summarize the existing knowledge.
Methods: Medline (1950 to May 2015) and EMBASE (1980 to May 2015) databases and rheumatology conference abstracts (2012-2015) were searched using MeSH terms and keywords to identify cohort and case-control studies reporting risk estimates (hazard ratios, relative risks, odds ratios) for the development of select rheumatic diseases in relation to exposure to measured air pollutants. Meta-analysis was completed using the generic inverse-variance approach with random effects models using RevMan version 5.3.
Results: A total of 103 non-overlapping publications were identified. 20 underwent full-text review with 9 studies included in qualitative synthesis and 2 studies used for meta-analysis. Three studies included subjects with RA (one cohort study, two case-control studies) and examined associations with exposure to nitrogen dioxide (NO2), sulfur dioxide (SO2) and particulate matter up to 10 micrometers in size (PM10). An association with particulate matter up to 2.5 micrometers in size (PM2.5) was studied in the RA cohort study, and additional pollutants (carbon monoxide, nitrous oxide, ozone and black carbon) in one case-control study. In the RA cohort study, there was no definite evidence for increased RA risk related to NO2, SO2, PM10 or PM2.5 exposures. In the case-control studies, there was no evidence of an increased risk for the development of RA with NO2 exposure (pooled OR 0.93, 95%CI 0.86 to 1.01) or SO2 (pooled OR 0.94, 95%CI 0.82 to 1.08), but possibly a protective effect with PM10 exposure (pooled OR 0.93, 95%CI 0.88 to 0.97). Both case-control studies in SARDs indicated higher odds of having SARDs in relation to increasing PM2.5 exposure. Two studies examined vasculitis conditions (ANCA vasculitis and PM10 exposure, Kawasaki Disease and PM2.5 exposure) but were unable

to draw definitive conclusions regarding associations. One study found an increased relative risk for JIA related to PM2.5 exposure but only in American children <5.5 years of age; the results were inconclusive when studying a broader JIA population in America and Canada.
Conclusion: Existing studies do not support an association between air pollutant exposures and the development of RA, SARDs or vasculitis, and uncertain effects in JIA. Measurement of cumulative and time-varying exposures are important considerations for future studies.

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Dermatomyositis and Hashimoto Thyroiditis

Gavin Sun (University of Calgary, Calgary); Paul MacMullan (University of Calgary, Calgary)

In this case report, a patient with both dermatomyositis and Hashimoto thyroiditis is described. Dermatomyositis is a rare auto-immune disease with predominantly skin and muscle involvement. In contrast, Hashimoto thyroiditis is a common auto-immune disorder. A dual diagnosis is rare, with only 11 previous cases described in the literature. The clinical features of both conditions are reviewed. Dermatomyositis is strongly associated with malignancy particularly if the patient is positive for Anti-TIF1 gamma antibodies, as in this case. Although much less common, there is an elevated risk of development of thyroid cancer in patients with long-standing Hashimoto's disease. The association of anti-TIF 1 gamma antibodies with thyroid cancer is unknown.

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Prevalence of Rheumatic Disease Related Medication use in the Sleep Laboratory Population and the Association with Obstructive Sleep Apnea

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Objectives: Objectives: Obstructive sleep apnea (OSA) is a major health concern in Canadian adults. Sex, age, obesity and family history are some of the risk factors associated with OSA. Some studies have suggested that sleep disorders are common concerns in rheumatoid arthritis (RA) and other rheumatic diseases patients. Therefore, the objective of this project was to assess the proportion of polysomnogram-(PSG)-diagnosed OSA patients on rheumatology related medications.
Methods: Methods: At a large university-based sleep disorder centre, a chart review was conducted to extract data including physician-diagnosed obstructive sleep apnea and medication history of patients specifically rheumatology disease modifying drugs, NSAIDs, acetaminophen, opioids and other medications. The eligibility criteria consisted of patients older than 18 years who were referred for an overnight PSG by a respirologist. A total of 811 charts were included in the analysis out of 1000 charts extracted. Remaining charts were excluded due to missing medical information (84 charts), missing diagnosis (2 charts) and titration study (103 charts).
Results: Results: The prevalence of physician PSG-diagnosed OSA was 86.1% (698/811). The mean age and standard deviation of the cases was 54.5 ± 14.3 years. Nearly 25.8% of OSA cases reported regular usage of the rheumatologic therapies and 5.9% reported regular opioid use. Stratified by sex, a higher proportion of female cases (28.3%) used rheumatology related drugs compared to their male cases counterparts (24.4%).
Conclusion: Conclusion: Given a considerable proportion of OSA patients using rheumatology drugs, it becomes imperative to raise awareness about OSA in rheumatic disease patients. A higher prevalence of rheumatology related drugs were used by patients undergoing

polysomnography. Compared to males, a higher proportion of females used these drugs.

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Participant Recruitment for Rural RA Care Delivery Model Trial

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Objectives: Background: Randomized controlled trials with defined outcome measures are an established method of comparing care delivery models. Study population selection therefore determines the degree of generalizability of trial findings. For this CIORA funded study of alternate care delivery models for Northern rural RA patients, we report on the outcome of the study population recruitment process.

Methods: Methods: The study target population was rheumatology clinic RA adult patients who resided 100+ kilometers outside of Saskatoon. Clinic patients were identified through database screening and invited to participate by the study coordinator. Interested patients who consented were randomly allocated to either continue travelling to usual rheumatology clinic in Saskatoon, or be followed through videoconferencing, located in five regional locations: Prince Albert, North Battleford, Rosetown, Wynyard and Arborfield. A rural-based physiotherapist examined patients in the videoconferencing group. Findings were reported via videoconferencing review with the urban-based rheumatologist. Follow-up visits were conducted every three months in both groups for nine months.

Results: Results: Of the 318 rheumatology clinic patients with diagnoses of RA who met geographic residence criteria, 231 declined the invitation to participate. Of the 87 patients who consented to participate and were randomized to either the videoconferencing group or traditional clinic group, a further 25 subsequently dropped out. Although many patients didn't provide a reason for declining the invitation or dropping out of the study, others offered explanations. These included for over 25% of patients the expressed preference for coming to the city rather than the videoconferencing clinic. Communicated rationales for this preference included, opportunities to visit family, combine rheumatology appointments with other errands/appointments, access various urban amenities, and greater retail shopping options than in their home communities. Face to face visits with their rheumatologist were preferred by 16%. Other patients (10%) did not wish to travel 'part-way' to the regional videoconferencing clinic, preferring, if it had been available, the distance assessment option within their own community, or to travel 'all the way' to the city. The majority of the patients, who dropped out post-randomization and provided explanations, indicated they were unhappy with their randomization allocation. This applied to five patients randomized to the videoconferencing arm and one patient in the traditional clinic arm.

Conclusion: Conclusion: A majority of RA patients living in Northern Saskatchewan declined to participate in a videoconferencing RA care delivery model. Many patients indicated they experienced auxiliary benefits or value from travelling to the city for their rheumatology care.

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Relationship of Sleep and Pain to Fatigue in RA Patients

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Objectives: Objectives: To evaluate relationships between fatigue and sleep in a rheumatoid arthritis (RA) outpatient clinic population
Methods: Methods: Consecutive RA patients were invited to participate in a self-administered questionnaire study that included 10-centimeter (cm) visual analogue scales (VAS) for fatigue, pain, global functioning, and sleep assessment instruments including the Berlin Questionnaire for categorization of risk for obstructive sleep apnea (OSA), the Epworth Sleepiness Scale (ESS) and the Pittsburgh Sleep Quality Index (PSQI). Other instruments included were the modified Health Assessment Questionnaire, stress scores, the Center for Epidemiologic Studies—Depression score, the 36-item short form quality of life measure, and the Rheumatoid Arthritis Disease Activity Index.
Results: Results: The mean fatigue score for the 134 RA participants was 4.77 cm (SD: 3.00) and correlated significantly with multiple variables including pain and the sleep assessment instrument scores. Multiple regression modeling identified pain (coefficient 0.502), the ESS (coefficient 0.1) and PSQI (coefficient 0.197) scores to provide a predictive model ($p<0.001$) for fatigue in this study population. Dividing the population into low and high fatigue severity groups based on the mean VAS score, revealed the odds ratio for having higher fatigue severity for those at high risk of OSA (Berlin Questionnaire) was 3.14, and for those with an abnormal ESS was 4.81.
Conclusion: Conclusions: Although pain exhibited the strongest relationship with fatigue, sleep related questionnaire scores were also predictive of fatigue severity. Screening for sleep disorders in RA patients with persistently high levels of fatigue is suggested.

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Unusual Cause of Fracture

Steven Thomson (University of Calgary, Calgary); Paul MacMullan (University of Calgary, Calgary)

A 41 year old man was seen as a new consult for polyarticular tophaceous gout, after the retirement of his previous rheumatologist

His past medical history includes well controlled exercise induced asthma and anemia of chronic disease.

He had suffered gout attacks monthly for more than 20 years, and was on chronic indomethacin for many years. He was trialed on Allopurinol for 3 days in 2007 but suffered a polyarticular flare and was hospitalized and never wished to resume allopurinol. He had been off therapy for the 7 years leading up to our visit. The gout started in the toes and ankles and spread to knees and elbows. On X-rays in 2008, he had clear erosions, and they had progressed by the time we met him. Aspiration of a tophus in the elbow demonstrated monosodium urate crystals. He was screened and found negative for rheumatoid arthritis.

We commenced allopurinol 300mg OD and 80mg Depo-Medrol as well as colchicine 0.6mg BID.

Prior to our meeting him, he had developed 2 ½ months of right foot pain without trauma. He had mild right ankle swelling and no systemic symptoms. X-rays were performed and revealed a large lytic lesion in the head and dome of the talus. CT scan was subsequently performed and demonstrated multiple intra-osseous cysts of talus, calcaneus and navicular bones. There was a pathologic fracture through the talus.

He subsequently underwent a medial malleolar osteotomy with internal fixation, open reduction and internal fixation of the talar fracture and bone graft to the right talar bone. Pathology on the bone fragment was consistent with gout tophus inside the cystic area.

Post operatively the patient has done well. The urate lowering therapy has been successful with a serum urate dropping from 700 to 360 and with slow resorption of the tophi. His flare frequency has decreased from monthly to none for nearly 6 months.
This case represents an unusual case of a pathological fracture in the talus caused by an internal gouty tophus. Numerous reports of patellar fracture secondary to tophi, and a few in the small bones of the hands exist. One case was reported of odontoid fracture and cord compression. Treat to target serum urate levels remains the standard of care, and can prevent complications such as these. This case demonstrates that chronic gout is a disease of urate crystal deposition which, if left untreated, may cause serious structural pathology.

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The Burden of Gout in Ontario, Canada: A Study of Healthcare Resource Utilization in a Canadian Public Payer Context

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Objectives: Gout, a common form of arthritis, is associated with sustained elevations in serum uric acid. The disease often presents with acute, painful joint flares associated with high healthcare resource use. While many US studies have reported the economic burden of gout to be substantial, limited investigation has been conducted on the disease burden in Canadian care settings. The primary objective of this study was to estimate the direct public healthcare cost and resource utilization between incident gout patients and matched gout-free patients in Ontario.
Methods: Incident gout patients indexed at first diagnosis or prescription for gout between April 1st 2008 and March 31st 2014, aged ≥66, and had uninterrupted Ontario Health Insurance Plan (OHIP) coverage in the one-year baseline period were included in the study. Gout patients were identified by having one gout diagnosis (ICD-9 274 or ICD-10 M10) and a second gout diagnosis or gout prescription. Patients were followed from index date to March 31st 2014. Linked OHIP prescription, primary, secondary, and tertiary care medical records were analyzed until death, end of OHIP eligibility, or type 1 censoring. Up to five gout-free patients were matched to each gout patient based on index year, age, gender, health region, and Adjusted Clinical Group® healthcare resource utilization band (RUB). Gout-free patients did not have a gout diagnosis or prescription within available history. Bang and Tsiatis adjusted healthcare costs and resource utilization were compared using bootstrap p-values.
Results: 189,634 patients were included in the study, 31,813 gout patients – 2.0% 6-year incidence – and 157,821 gout-free patients. Patients were 56.5% male, had a median RUB of moderate morbidity, and had a median age group of 75-79. One-year baseline comorbidities were similar between the two groups except for a higher renal disease prevalence ($p<0.01$) in the gout patients (15.5%) compared to gout-free patients (4.2%). Analyzing six year total primary, secondary, and tertiary healthcare costs, gout patients (mean [standard deviation] = $34,697 [$363]) incurred a significantly higher average healthcare cost compared to gout-free patients ($24,9 [$134]), for an average incremental cost of $9,733 ($p<0.01$). Similar trends were observed in every individual healthcare component costs and utilizations metrics.
Conclusion: Following onset of gout, patients in Ontario incur significantly greater healthcare costs and healthcare resource use compared to matched gout-free patients. Alternative gout management strategies should be investigated to reduce the incremental economic and resource

burden of gout borne by the Ontario healthcare system.

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"Disease Severity and Glucocorticoids Reduction in Systemic Lupus Erythematosus (SLE) Patients Receiving Belimumab in Clinical Practice Settings: Results from OBSErve Study in Canada"

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Objectives: To describe the overall patterns of SLE care, clinical outcomes and changes in glucocorticoids dose following 6 months of therapy with belimumab in Canadian clinical practice settings.

Methods: OBSErve Canada (117300) is a Canadian multicenter retrospective medical chart review study. 7 rheumatologists who treat >10 SLE patients annually and have >5 years of clinical practice experience were recruited. Physicians randomly selected adult SLE patients who had received >8 infusions of belimumab as part of usual-care. Baseline visit was defined as the date of the first belimumab infusion. The study period included 6-month treatment history prior to the baseline visit and 6-month follow-up after the baseline visit. Physician assessments included the following: demographics; comorbidities; SLE disease characteristics; physician-determined overall clinical improvement response (≥20%, ≥50%, ≥80); and concomitant medications.

Results: 52 eligible patient charts were abstracted. Patient characteristics at baseline were mean (sd) age: 45.6 (10.8) years; female: 94%; Caucasian: 65%; and lupus disease duration >5 years: 77%. The most common reasons for initiating belimumab were: previous treatment not working (69%), decrease glucocorticoid dose (67%), and patient condition worsening (50%). At belimumab initiation, over 94% of patients had moderate to severe lupus disease based on physician-assessed disease severity. Oral glucocorticoids, antimalarials and immunosuppressants were used by 85%, 77% and 73% of patients at baseline, respectively. Mean glucocorticoids dose at belimumab initiation was 13.6 (10.0) mg/day. In patients receiving glucocorticoids ≥7.5 mg/day at baseline (n=30), mean glucocorticoids dose was 17.8 (9.5) mg/day. Following 6 months of belimumab, 81%, 58% and 17% of patients were observed to have an overall clinical improvement of >20%, >50% and >80%, respectively. Patients on glucocorticoids at belimumab initiation had a mean reduction in glucocorticoids dose of 5.8 (8.9) mg/day; 11% of patients completely discontinued glucocorticoids, and among those still taking glucocorticoids, 67% decreased their dose at 6 months. The mean reduction in glucocorticoids dose in patients receiving ≥7.5 mg/day glucocorticoids at baseline was 8.2 (9.8) mg/day.

Conclusion: In this retrospective chart review, over 80% of patients receiving belimumab for 6 months as part of usual clinical practice experienced a ≥20% improvement in physician-assessed disease severity and almost 60% experienced a ≥50% improvement in physician-assessed disease severity. Belimumab therapy led to a decrease in glucocorticoids use, with over 65% of patients reducing their daily glucocorticoids dose.

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Patterns of Biologics Use among Women with Autoimmune Disease Before, During, and After Pregnancy: A Population-based Study

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Objectives: Most autoimmune diseases affect women disproportionately and peak during childbearing years. Biologics are a recognized therapeutic option for these patients. However, there is still limited knowledge about their use and timing during pregnancy. As such, the objective of this study was to characterize real-world patterns of biologic use among women with autoimmune diseases before, during, and after pregnancy.

Methods: We used administrative data from British Columbia that includes all physician visits, hospital admissions, and dispensed medications for women who had at least one pregnancy between 01/01/2002 and 12/31/2012. These data were linked to a perinatal registry capturing > 99% of hospital and home deliveries. This data source provides the most precise pregnancy start date, calculated from gestational age confirmed by ultrasound, allowing the best ascertainment of medication exposure timeframes. We identified women with autoimmune disease defined by having ≥ 2 ICD-9/10 codes for rheumatoid arthritis, psoriasis/psoriatic arthritis, systemic lupus erythematosus and related diseases, systemic autoimmune rheumatic diseases, ulcerative colitis, Crohn's disease, or multiple sclerosis during the two years prior to pregnancy start date. Using information on prescription dates and estimated start date of pregnancy, we determined the use of biologics medications including adalimumab, etanercept, infliximab, golimumab, certolizumab, tocilizumab, abatacept, rituximab, anakinra, ustekinumab, alefacept, belimumab, and natalizumab, for each of the following exposure timeframes: pre-conception [-365 days to start date of pregnancy (day0)); 1st trimester [day 0 to 90); 2nd trimester [day 90 to 180); 3rd trimester [day 180 to date of delivery); and post-partum [date of delivery to day 365].

Results: There were 4126 pregnancies in 3741 women with autoimmune disease during the study, of which 159 (3.9%) women were exposed to biologics. Mean maternal age at delivery was 31.9 (SD 4.8) years. During the pregnancy period [pre-conception to post-partum], 1920 prescriptions for biologics were filled, of which 93% were for a TNF-α inhibitor. Exposure most commonly occurred in the post-partum period, where 24% of woman had biologics initiated during this time. 22% were exposed throughout the entire course of pregnancy, while 19% were on a biologic during the pre-conception period, discontinued during pregnancy, and restarted post-partum.

Conclusion: This population-based study provides data on real-world patterns of biologics use among women with autoimmune disease, and their timing regarding pregnancy. These findings highlight the need for further investigation into the risk-benefit profile of biologics through pregnancy and post-partum, for both mothers and infants, as well as the implications of stopping therapy during pregnancy.

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Initial Risk Factor Profile and Long-term Cardiovascular Outcome and Mortality in Women with Systemic Lupus Erythematosus. A Prospective Study

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Objectives: Accelerated atherosclerosis in systemic lupus erythematosus (SLE) is driven by traditional and disease-related risk factors. The aim of this study was to prospectively investigate the impact of these variables on the development of clinical cardiovascular disease (CVD) in lupus patients.

Methods: Two hundred and fifty women with SLE and no prior history of CVD (age 44.5±12

years, disease duration 13.7±9.7 years) and 250 age-matched healthy women (age 44.1±14 years) were recruited between 1998 and 2000. Recorded risk factors for all participants at baseline included arterial hypertension, diabetes mellitus, dyslipidemia (total cholesterol, triglycerides, HDL, LDL, VLDL), smoking, family history of premature CVD and body mass index. Disease-related risk factors were regularly recorded. Cardiovascular events (CVEs) included angina pectoris, myocardial infarction (MI, fatal and non-fatal), transient ischemic attack (TIA) and stroke (fatal and non-fatal). Statistical software SAS (version 9.3) was used for analysis; $p<0.05$ was considered significant.

Results: Follow-up data after 15 years were available for 210 patients and 138 controls. Initial risk factor profile revealed a higher prevalence of arterial hypertension (67/210, 31.9% vs 17/138, 12.3%, $p<0.001$) and diabetes mellitus (9/210, 4.3% vs 0/138, 0%, $p=0.036$) in patients' group; the frequency of other variables did not differ significantly. CVEs occurred in 41 patients (19.52%) and 8 controls (5.80%), $p<0.001$. Coronary artery disease (CAD, angina and MI) was more common in SLE than controls (32/210, 15.24% vs. 5/138, 3.62%, $p=0.0041$) whereas there was no statistically significant difference for cerebrovascular disease (TIA and stroke), (9/210, 4.29% vs. 3/138, 2.17%, $p=0.213$). Multivariate Cox-regression analysis demonstrated SLE [HR=2.82, 95% CI 1.27-6.28], age at study entry [HR=1.06, 95% CI 1.03-1.09], number of traditional risk factors [HR=1.61, 95% CI 1.16-2.24], VLDL [HR=3.03, 95% CI 1.49-6.15], homocysteine≥15μmol/L [HR=1.09, 95% CI 1.02-1.16] and C-reactive protein [HR=1.77, 95% CI 1.07-2.92] to be important predictors for CVEs in all participants. There were 31 deaths in SLE patients (10 were attributed to CVD) and 6 in controls (none due to CVD). SLE was a significant predictor for all-cause mortality [HR=4.2, 95% CI 1.02-17.39, $p=0.047$].

Conclusion: SLE patients have a 3-fold increased risk for clinical CVD as compared to healthy controls in the long term. Coronary heart disease was significantly more frequent than cerebrovascular disease. SLE itself as well as traditional risk factors are important predictors for CVEs as well as all-cause mortality.

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Does Renin-angiotensin System Blockage Protect Lupus Nephritis Patients from Atherosclerotic Cardiovascular Events? A Case-control Study

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Objectives: Angiotensin converting enzyme inhibitors (ACEIs) and receptor blockers (ARBs) are currently used as an adjuvant treatment in lupus nephritis (LN) patients for the optimal control of proteinuria. However, it is not known if these agents have an atheroprotective effect, similar to that described in other at-risk populations, which was the primary aim of this study.

Methods: Using the electronic database of the longitudinal observation cohort study of the University of Toronto Lupus Clinic, we identified 144 patients (123 females, mean age at disease onset 34±12.1 years, mean follow up time 14.9±8.6 years) with LN (diagnosis according to 1997 ACR criteria) who were treated with ACEIs/ARBs for at least 5 years for proteinuria. The control group comprised of 301 LN patients (262 females, mean age at disease onset 34.1±13.2, mean follow up time 13.4±7.9 years) who did not receive ACEIs/ARBs treatment. All patients were followed for the occurrence of atherosclerotic cardiovascular events (CVEs), consisting of myocardial infarction (MI), angina, percutaneous transluminal coronary angioplasty (PTCA), coronary artery bypass graft (CABG), congestive heart failure and pacemaker insertion as well as peripheral vascular disease, transient ischemic attack (TIA) and stroke. Patients with pre-existing

CVEs were excluded. Statistical software SAS (version 9.3) was used for analysis; $p<0.05$ was considered significant.
Results: Patients treated with ACEIs/ARBs were more frequently hypertensive [100% vs 52.8%, $p<0.001$] and diabetic [10.4% vs 4.7%, $p=0.021$] whereas the controls had more frequently hypercholesterolemia [27.9% vs 18.1%, $p=0.024$] and elevated triglycerides [14% vs 4.9%, $p=0.004$]; other variables did not differ significantly. There were no significant differences in the cumulative occurrence of CVEs between the two groups [14/144, 9.7% for treated vs 26/301, 8.6% for untreated patients, $p=0.708$]; however, hard events (stroke, MI, CABG, PTCA) were less frequent in treated patients [6/144, 4.17% vs 16/301, 5.32%]. Cerebrovascular disease (TIA and stroke) was less frequent in treated patients [1/144, 0.7% vs 7/301, 2.33%]. Regression analysis (Weibull parametric model) failed to confirm ACEIs/ARBs non-use as an important predictor of future CVEs. The only significant predictors in both groups were age at LN diagnosis and cumulative corticosteroid dose.
Conclusion: Our data do not support the hypothesis that ACEIs/ARBs may be protective against atherosclerotic CVEs in LN patients. In this cohort, only age at LN diagnosis and cumulative prednisone dose were important predictors for these outcomes.

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Hydroxychloroquine-Induced Cardiomyopathy in Systemic Lupus Erythematosus

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Background-objective: Antimalarials (chloroquine and hydroxychloroquine, HCQ) are considered the cornerstone of long-term management in systemic lupus erythematosus (SLE) and currently recommended for all patients who have no specific contra-indications. Regarding their safety profile, retinopathy represents the most serious complication whereas neuromuscular toxicity and cardiomyopathy have been rarely reported in the literature. Herein, we report a case of HCQ-induced cardiomyopathy, emphasizing the diagnostic approach and potential risk factors.

Case presentation: A 74-year-old female patient (initial SLE diagnosis at age 30) presented with chest discomfort along with exertional dyspnea. Cumulative disease manifestations included polyarthritis, mucocutaneous manifestations, Raynaud’s phenomenon, pericarditis, Libman-Sacks endocarditis and ischemic stroke; co-morbidities included secondary antiphospholipid syndrome, pernicious anemia, hypothyroidism and arterial hypertension. Current medications included HCQ 342mg/day (since 2002), prednisone 5mg/day (initiated in 19), warfarin, antihypertensives and levothyroxine. Her long-term course was uneventful with clinically and serologically inactive disease since 2005. However, the patient had chronically (since 2006) elevated creatine phosphokinase (CPK, ranging between 2 and 3 times the upper limit of normal) with no clinical evidence of myopathy.

Initial ECG showed sinus rhythm, left axis deviation and atypical left bundle branch block. Echocardiogram revealed severe concentric left ventricular hypertrophy (LVH) and systolic dysfunction (LVEF=35-40%) with a restrictive pattern; right ventricle free wall and intra-atrial septum were also thickened along with bi-atrial enlargement. Cardiac MRI revealed no evidence of fibrosis or scar and no late gadolinium enhancement. Her troponin T was 270ng/l (normal

range <14ng/l) and N terminal-pro-B type natriuretic peptide (NT-proBNP) was markedly elevated at 1080pmol/l.

Extensive genetic testing (for 62 genes involved in hypertrophic cardiomyopathy), including full sequencing of alpha-galactosidase (GLA) for Fabry disease was negative. Further investigation with endomyocardial biopsy (EBM) showed mild endocardial and interstitial fibrosis; myocardial fibres were hypertrophic with marked vacuolation (intracellular lipid accumulation). On electron microscopy, most cardiac fibers showed abundant lamellar phospholipid membranes in stacks and whorls. Pathologic findings were consistent with HCQ-induced cardiomyopathy. HCQ was discontinued and symptomatic therapy with diuretics led to partial symptom relief. Conclusion: HCQ-induced cardiomyopathy is a rare complication of long-term antimalarial treatment and should be taken into consideration in cases of unexplained, new-onset heart failure with evidence of hypertrophic restrictive cardiomyopathy. Secure diagnosis requires endomyocardial biopsy. Duration and cumulative antimalarial dose play a significant role; in addition, myotoxicity, expressed with elevated muscle enzymes, or heart-specific tests (troponin, proNT-BNP) may be a predictive factor.

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Evolution of Disease Burden over 7 Years in a Multicentre Inception SLE Cohort

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Objectives: The evolution on an annual basis of disease activity and damage and the annual accrual of ACR criteria and key autoantibodies in patients with SLE is not well described. We report the annual occurrence of these features in an inception cohort of patients with SLE.

Methods: An international research network comprising 33 centres from 11 countries has followed an inception cohort of SLE patients yearly according to a standardized protocol between 2000 and 2014. Of these, 748 patients followed for a minimum of 7 years constitute the study population. Clinical disease activity was assessed using SLEDAI-2K and disease damage using the SLICC/ACR Damage Index (SLICC/DI). ANA, Anti-DNA and anticardiolipin, antibody levels, the presence of the lupus anticoagulant were assessed at each visit. Descriptive statistics were used.

Results: Of the 748 patients followed for at least 7 years, 90.2% were female, 49.1% were Caucasian, 14.8% were Black, 16.3% were Asian, 15.9% Hispanic and 3.9% other. 40.8% were married and 57.2% had at least College education. Their mean age at enrolment was 34.7±13.4 years and SLEDAI-2K at enrolment was 5.6±5.7. The duration from diagnosis to enrolment was 5.5±4.2 months. Mean SLEDAI-2K decreases from 5.62±5.70 at enrolment to 3.17±3.57 in year 7. SLEDAI-2K was significantly lower at each year in Caucasians compared to Non-Caucasians (enrolment: 4.86 ± 5.45 vs. 6.36 ± 5.85, p=<.001). Mean SLICC/DI increases progressively from 0.14±0.49 at enrolment to 1.08±1.45 in year 7, but there was no significant difference at each year between Caucasians and Non-Caucasians. Mean ACR criteria accumulation gradually increases over 7 years from 4.94 ± 1.02 to 6.08 ± 1.37 in Caucasians and from 5.15 ± 1.21 to 6.24 ± 1.49 in Non-Caucasians. At enrolment and year 1 ACR accumulation was significantly lower in Caucasians vs non Caucasians. (enrolment: 4.94 ± 1.02 vs 5.31 ± 1.18, p=0.012; year 1: 5.15 ± 1.21 vs 5.53 ± 1.31, p=0.023). Although ANA positivity is high at enrolment (96.2%), the percent positivity remains stable over 7 years. Frequency of anti-DNA positivity is high at enrolment (41.2%) and decreased by almost 7% over 7 years. Patients with positive

anticardiolipin antibody decreased from 585 (14.7%) to 119 (9.6%) over 7 years. Lupus anticoagulant decreased from 618 (21.8%) to 115 (11.6%).
Conclusion: As expected disease activity in newly diagnosed patient's decreases over their first 7 years but disease damage increases. Similarly, key antibody levels with the exception of ANA positivity decreased over the first 7 years.

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Survival of Etanercept (ETN) Responders after Methotrexate (MTX) Failure when ETN is Initiated as Mono or Combination Therapy or ETN Mono Therapy after MTX Withdrawal from ETN/MTX Combination in Long Standing Rheumatoid Arthritis (RA). A Single Center

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Objectives: The purpose of this study was to evaluate the long term sustainability of ETN for efficacy in ETN responsive patients after MTX failure when initiated as mono or combo therapy.
Methods: A retrospective cohort based on a chart review of 140 pts from a single rheumatology center who initiated ETN as their first biologic was carried out. Only data from 104(74.3%) pts who had achieved DAS28 low disease or remission by 18 months(mo.) after initiation ETN mono or combo were considered for analysis in order to more stringently define secondary ETN efficacy failures in the survival analysis. Pts discontinuing ETN before 18mo or for adverse effects at any time were excluded from the long term survival analysis. Three groups of pts were included in the long term survival analysis:(i) pts initiating and continuing combo ETN plus MTX,(ii) patients initiating and continuing ETN mono because of prior intolerance to MTX,(iii) patients initiating ETN/MTX combination for 18 months who subsequently withdraw MTX from ETN/MTX combo.
Results: Of the 140 total ETN treated pts,36(25.7%) discontinued ETN for efficacy before 18mo:11(7.9%)before 6 mo,17(12.1%)between 612mo and 8(5.7%) between 1218 mo. In the 104 pts achieving low disease or remission for 18mo, 93(82%) were women, mean(SD) age 52.4(12.6) with a disease duration of 22.4(9.7) years of which 71(77.2%) were seropositive. Baseline disease activity(at ETN initiation) of the 46 pts initiating ETN mono revealed a tender joint count(tjc) of 4.9(7.0) a swollen joint count(sjc) of 7.5(5.9) an ESR of 29.5(21.3) and DAS28 score of 4.3(1.4).Of 35 patients adding ETN to the MTX combo, the baseline(at MTX initiation) tjc was 4.9(5.1), sjc 9.1(5.9),ESR 40.4(31.1) and DAS28 score of 4.8(0.9).A separate population of 23 pts receiving combo therapy withdrawal MTX(mean(SD) time from withdrawal was 21.8(19.3) mo with a median of 16(mo).The baseline(at MTX initiation) tjc was 2.52(3.8),sjc 9.1(4.5),ESR 25.6(14.3) and DAS28 score of 3.8(1.1) The results of the survival analysis of the 104 pts showed comparable survival of the all 3 groups at 10years(log rank 0.8582).Survival of ETN after MTX withdrawal appeared greater than the other groups but its survival analysis was initiated 18 months after MTX withdrawal.
Conclusion: In this preliminary analysis of extremely long standing RA patients, ETN responders who achieve low disease or remission by18 months have a high likelihood of sustainability whether initiating ETN as mono or combo therapy or withdrawing MTX from the

combo therapy. Larger patient populations need to be studied for confirmation of the results.

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Predictors of Response in Patients with Ankylosing Spondylitis Treated with Infliximab or Golimumab in a Real-World Setting

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Objectives: Recent studies have suggested that early and aggressive treatment of spondyloarthritis, including ankylosing spondylitis (AS) and psoriatic arthritis (PsA), may be associated with favorable patient outcomes, reducing synovial inflammation, delaying joint damage, and maintaining functional status. The objective of this analysis was to determine the predictive factors of ASDAS remission in AS patients treated with infliximab (IFX) or golimumab (GLM) in a Canadian routine clinical care setting.

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis (RA), ankylosing spondylitis, or psoriatic arthritis with IFX or GLM. Eligible patients for this analysis included AS patients treated with IFX or GLM between 2005 and 2015. Variables associated with ASDAS remission (<1.3) were examined using univariate analysis and those showing a statistical trend (P<0.150) were considered in multivariate logistic regression analysis to identify independent predictors.

Results: A total of 582 patients were included in the analysis with a mean (SD) age of 45.8 (12.2) years and a disease duration of 8.3 (10.2) years. The majority of patients were male (57.2%). Upon 12 months of treatment statistically significant and clinically meaningful improvements were observed in ASDAS (3.6 vs. 2.3; P<0.001), BASDAI (6.2 vs. 3.8; P<0.001), BASFI (5.6 vs. 3.9; P<0.001), morning stiffness (74.2 vs. 42.8; P<0.001), and HAQ-DI (1.12 vs. 0.77; P<0.001). The proportion of patients who achieved ASDAS remission was 22.3% and 22.2% at 6 and 12 months, respectively. Sustained remission was achieved by 16.0%. In univariate analysis, male gender (male vs. female: 25.2% vs. 14.1%; P=0.073), previous use of a biologic (experienced vs. naive: 37.5% vs. 20.9%; P=0.129), lower ESR (P=0.096), lower BASFI (P=0.003), lower BASDAI (P=0.002), lower morning stiffness (P=0.120) and lower HAQ-DI (P=0.001) showed a statistical trend in their association with ASDAS remission at 12 months of treatment. Age, disease duration, CRP, psoriasis, peripheral arthritis, inflammatory bowel disease, uveitis, HLA-B27 and presence of enthesitis did not have an impact of ASDAS remission. Multivariate logistic regression analysis showed that, upon adjusting for covariates, non-exposure to a previous biologic (OR=3.40; P=0.078) approached statistical significance and lower HAQ-DI (OR=0.36; P=0.004) was a significant independent predictor of ASDAS remission.

Conclusion: Twelve-month treatment with IFX or GLM in a real-world setting was associated with significant improvements in disease parameters. Prior exposure to a biologic and lower HAQ-DI were identified as independent predictors of ASDAS remission upon adjusting for potential confounders.

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Predictors of Early Minimal Disease Activity in PsA Patients Treated with Anti-TNF in a Real-World Registry

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Objectives: Early achievement of minimal disease activity (MDA) is recommended as a valid treat-to-target approach in psoriatic arthritis (PsA). The purpose of the current analysis was to evaluate predictors of MDA achievement in PsA patients treated with anti-TNF agents in Canadian routine clinical care. Early achievement of minimal disease activity (MDA) is recommended as a valid treat-to-target approach in psoriatic arthritis (PsA). The purpose of the current analysis was to evaluate predictors of MDA achievement in PsA patients treated with anti-TNF agents in Canadian routine clinical care.

Methods: Biologic Treatment Registry Across Canada (BioTRAC) is an ongoing, prospective registry of patients initiating treatment for rheumatoid arthritis, ankylosing spondylitis, or PsA with Infliximab (IFX) or Golimumab (GLM). Eligible people for this analysis included PsA patients treated with IFX who were enrolled since 2005 or with GLM enrolled since 2010 and with available MDA information at baseline, 6 months, and/or 12 months. MDA was defined as the fulfillment of ≥5 of the following criteria: TJC28≤1, SJC28≤1, PASI≤1 or BSA≤3, Pain (VAS)≤15mm, PtGA (VAS)≤20mm, HAQ ≤0.5, tender entheseal points ≤1. Independent predictors of MDA achievement were assessed with logistic regression.

Results: A total of 196 patients (51.4% male and 87.2% bio naive) were included with a mean (SD) age and disease duration of 49.8(11.1) and 5.4(6.3) years, respectively. The proportion of patients with MDA was 11.7% at baseline, 43.5% at 6 months, 44.8% at 12 months, and 49.1% at either 6 or 12 months. Among patients with MDA at 6 months, 75.7% had sustained MDA at 12 months. Patients achieving MDA during follow-up had significantly lower disease activity at baseline; mean (SD) disease parameters were: SJC28: 3.24(3.58) vs. 5.47(4.31), P<0.001; TJC28: 3.75(4.00) vs. 8.66(6.53), P<0.001; pain: 35.39 (25.11) vs. 55.70(22.93), P<0.001; PtGA: 38.51(25.00) vs. 56.15(25.13), P<0.001; HAQ-DI: 0.71(0.61) vs. 1.33(0.57), P<0.001; MDGA: 4.25(2.38) vs. 5.84(2.07), P<0.001); enthesitis count: 2.62(1.60) vs. 4.97(3.48), P=0.008. Multivariate logistic regression analysis showed that lower baseline HAQ (OR=0.243; P<0.001), lower TJC28 (OR=0.889; P=0.008), and lower enthesitis count (OR=0.817; P=0.817) were significant predictors of MDA achievement over 12 months of treatment.

Conclusion: The results of the current analysis have shown that 50% of patients treated with IFX or GLM in routine clinical care achieve MDA within the first year of treatment. Lower baseline HAQ, lower TJC28, and lower enthesitis count were identified as significant predictors of MDA achievement.

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Teaching Appropriate and High Value Rheumatology Care through Simulation: Virtual Interactive Cases

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Objectives: The objective of this study was to assess and evaluate the effectiveness of Rheumatology Virtual Interactive Case (VIC) modules to teach appropriate and high value rheumatology care through simulation. These were developed based on a needs assessment to improve rheumatologic cost-conscious clinical decision-making skills among medical trainees.
Methods: Rheumatology Virtual Interactive Cases were developed to allow trainees to diagnose and manage rheumatology patients through history-taking, physical exams, laboratory investigations, radiological imaging and consultations. Cases include gout, septic joints, psoriatic arthritis, rheumatoid arthritis, polymyalgia rheumatic and ankylosing spondylitis. These cases were distributed to medical students, internal medicine residents and rheumatology trainees rotating through Rheumatology at Sunnybrook Health Sciences, Toronto. Case activities were tracked through a secure database and evaluated based on actions performed and missed, the cost and time of each assessment, and the diagnostic accuracy. The costs have been derived from the Ontario Health Insurance (OHIP) Schedule of Benefits and Fees. Participants were asked to complete the 5-item Rheumatology Virtual Interactive Cases Feedback Survey, collected anonymously by Google Forms and analyzed with descriptive statistics using Excel.
Results: Between June to September 2015, twelve medical trainees completed a total of 18 VIC rheumatology modules, with each case completed at least once. Respondents included six second-year medical students, four internal medicine residents and two rheumatology fellows. Tracked cases revealed that on average, 11.9 minutes were taken to complete each case, and trainees spent $207.75 and 68 virtual minutes on each case. The diagnostic accuracy was 100% and the management accuracy was 58.3%. The average number of essential actions performed was 43, the average number of essential actions missed was 74, and the average number of non-essential actions performed was 8. In addition to qualitative feedback provided, 85.7% of respondents agreed or strongly agreed that they felt more comfortable to work-up and diagnosing similar rheumatology cases in the future and 57.1% of respondents agreed or strongly agreed that the VIC modules increased their ability to appropriately order rheumatologic investigations.
Conclusion: Initial evaluation of the Rheumatology VIC modules supports their role as an effective tool to be used in rheumatology training and resource stewardship. Future directions involve improving current Rheumatology Virtual Interactive Cases based on the feedback received and will be dedicated towards developing new cases. It will be worthwhile to assess clinical performance of trainees pre and post VIC modules and as they progress through their rheumatology rotation.

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"Recurrence of Scleroderma Renal Crisis in Transplanted Kidney Leading to Graft Failure"

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Scleroderma Renal Crisis (SRC) is a rare but life-threatening complication of Systemic Sclerosis, which may lead to end-stage renal disease requiring renal transplantation. Recurrence of SRC in renal allograft is even rarer and therefore knowledge of this condition is largely lacking. We present a case of a 55 year old man diagnosed with severe diffuse cutaneous systemic sclerosis with two prior episodes of SRC leading to end-stage renal disease, despite treatment with Captopril, Amlodipine, and Losartan. Ultimately the patient required renal transplantation after

five years of hemodialysis. One year after transplantation a third renal crisis occurred, this time in the allograft kidney. The differential diagnosis was broad, including immune mediated allograft rejection, prerenal and post-renal causes, calcineurin nephrotoxicity, viral infection and recurrent scleroderma renal crisis. The challenge with the differential stemmed from a one month period during which he was off all medications as well as an episode of bacterial pneumonia, sepsis and diarrhea. Clinically the patient met proposed characteristics of SRC by expert consensus and the International Scleroderma Renal Crisis Survey and, after ruling out pre and post-renal causes, renal biopsy showed subacute changes consistent with scleroderma and no evidence of allograft rejection, calcineurin inhibitor toxicity or viral inclusions. The patient is now hemodialysis dependent. This interesting case highlights that while recurrent SRC in allograft kidney is rare, it remains an important consideration in patients with renal transplants due to scleroderma and presenting with acute kidney injury. Future investigations into long-term outcomes in transplanted patients as well as risk factors associated with recurrence are necessary to further our understanding of this subject.

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B Cell Phenotypic Changes in Anti-Nuclear Antibody Positive Individuals Prior to the Onset of Systemic Autoimmune Rheumatic Disease

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Objectives: Patients with systemic autoimmune rheumatic diseases (SARD) often have a prolonged pre-clinical phase during which they are anti-nuclear antibody (ANA)+ but lack clinical symptoms. It has been proposed that progression from asymptomatic autoimmunity to clinical disease is accompanied by immunologic changes that could be used as predictors of disease development. Previous studies indicate that a number of B cell phenotypic changes are seen in SARD patients including changes in the proportions of various naïve and memory B cell subsets, increased B cell activation and elevated levels of plasmablasts/plasma cells. Here we examined whether ANA+ individuals who lack sufficient symptoms for a SARD diagnosis share any of the B cell phenotypic changes seen in early SARD.

Methods: ANA+ individuals who: 1) lacked clinical symptoms of SARD (ANS); 2) had a least one clinical symptom of SARD (UCTD); or 3) had a recently diagnosed steroid and immunosuppressive naïve SARD (SLE, SS, SSc, MCTD, DM) were recruited from clinics at UHN/MSH hospitals. Healthy controls (HC) were also recruited. PBMCs were isolated over a Ficoll gradient, stained with various combinations of fluorescently labeled antibodies and analyzed by flow cytometry. ANAs were measured through the hospital laboratory.

Results: B cell phenotypes were examined for 35 HC, 40 ANS, 24 UCTD, and 53 early SARD (22 SS, 19 SSc, 7 SLE, 2 MCTD, 1 DM) patients. Although significantly increased proportions of CD19lo/-CD38+++CD27+++ plasmablasts/plasma cells were seen in the majority of SARD patients, these were not seen in ANS and UCTD patients. Patients with early SARD had a number of changes in their naïve and memory B cell subsets including: increased proportions of mature naïve B cells; increased proportions of T1T2 cells; and decreased proportions of switched memory B cells (CD27+IgD-). Similar decreases in the proportion of switched memory B cells

were seen in ANS and UCTD patients, and as seen for the SARD patients, these cells were activated with elevated levels of CD86 as compared to HC. When all ANA+ individuals were examined there was a significant association between ANA titer and the proportion of plasmablast/plasma cells as well as the reduced size and increased activation of the switched memory B cell compartment. This correlation was also seen when the ANS subset was examined alone.

Conclusion: B cell phenotypic abnormalities, predominantly affecting the memory compartment, appear to precede the onset of clinical disease in ANA+ individuals and correlate with autoantibody levels as reflected by the ANA titer.

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Systematic Review on the Evidence of Pharmacological Treatments Intended to Improve or Slow Progression of Connective Tissue Disease Associated Interstitial Lung Disease

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Objectives: Connective tissue disease associated interstitial lung disease (CTD-ILD) is a heterogeneous group of diffuse parenchymal lung diseases. This systematic review aims to identify, appraise and synthesis the evidence for treatments intended to improve or slow progression of CTD-ILD.

Methods: A search strategy was applied to three databases to identify studies relating to pharmacologic treatments intended to improve or slow progression of CTD-ILD. Endpoints of interest include forced vital capacity (FVC) and diffusion capacity of carbon monoxide (DLCO). Studies were eligible if they included ≥ 10 patients, CTD diagnosis, ILD diagnosis and the use of a pharmacologic agent. Two authors independently reviewed and extracted data from acceptable studies.

Results: 4727 unique citations were identified. Thirty-seven studies consisting of six RCTs and thirty-one observational studies were included. Seventeen studies addressing the effect of CYC on CTD-ILDs were analyzed. Thirteen were specific for SSc-ILD, one for a pooled variety of CTD-ILDs, one for MCTD-ILD and one for PM/DM-ILD. FVC and DLCO after 12 months of CYC were largely unchanged, with a mean difference of 2.97% (CI 0.04 to 5.89) and 0.30% (CI -2.96 to 3.55). Seven studies addressing the effect of MMF on CTD-ILDs were analyzed. Five were specific for SSc-ILD and two pertained to a pooled variety of CTD-ILDs. FVC and DLCO in CTD-ILDs after 12 months of MMF were largely unchanged, with a mean difference of 0.46 % (CI -0.10 to 1.02) and 1.50% (CI -0.56 to 3.57) respectively. Four studies addressing the effect of calcineurin inhibitors on CTD-ILDs were analyzed. Two were specific for anti-synthetase syndrome, one for PM/DM-ILD and one for a pooled variety of CTD-ILDs. FVC and DLCO in CTD-ILDs after 12 months of calcineurin inhibitors were increased, with a mean difference of 7.48% (CI 1.45 to 13.5) and 4.83% (CI -3.26 to 12.92) respectively. One RCT assessed the effect of Bosentan in SSc-ILD and found no significant difference in the FVC and DLCO. Three studies addressed the effect of Rituximab on CTD-ILDs. One pertained to SSc-ILD and the rest to a pooled variety of CTD-ILDs. Improvement was observed in FVC and DLCO. Two observational studies on the effect of Imatinib in SSc-ILD showed a trend towards stability in FVC and DLCO.

Conclusion: Pooled analyses demonstrate stability of pulmonary function in CYC, MMF and calcineurin inhibitors in patients with CTD-ILDs. Additional high quality prospective studies are required to confirm these findings.

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Back Pain in Psoriatic Arthritis: Defining Prevalence, Characteristics and Performance of the Different Inflammatory Back Pain Criteria in a Large Psoriatic Arthritis Cohort

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Objectives: Estimates of axial involvement in psoriatic arthritis (PsA) vary from 25%-70% depending on the inclusion criteria. Three sets of criteria are available for inflammatory back pain (IBP) in Ankylosing Spondylitis (AS): Calin, Berlin and ASAS criteria. We aimed to determine whether current criteria for IBP used for AS are useful screening tools for axial involvement in PsA.

Methods: Patients with PsA have been followed prospectively at 6-12 month intervals according to a standard protocol since 1978. Spinal radiographs are performed at 2 year intervals. Data from the first visit since 2010 were extracted from database on the presence of back pain, as well as criteria for IBP (Calin, Berlin and ASAS). At each visit a rheumatologist recorded whether a patient had back pain, and whether it is inflammatory or mechanical. We tested the agreement between physician assessment (presence or absence of IBP) and IBP criteria. Patients whose radiographic changes met the New York (NY) Criteria for AS or had any radiographic changes consistent with sacroiliitis and/or syndesmophytes were analyzed for agreement with the presence of any BP, IBP by physician assessment and fulfilling IBP criteria, using the Kappa coefficient.

Results: 160 patients who met the criteria for any BP were identified from the database. Patients were mostly male (51.9%), mean age of onset of PsA was 44.2±13.7, and mean age at first clinic visit was 47.7±12.96 years. 143 patients had radiographic data available at clinic entry. Prevalence for BP was 55%, IBP (with or without MBP) 33.1% and MBP 21.9%. 24 out of 143 (17%) patients with baseline x-rays fulfilled the NY radiographic criteria for AS. 37 out of 143 (26%) patients had any radiological sacroiliitis and/or syndesmophytes. The agreement (kappa coefficient) between physician assessment and IBP criteria was highest for the Calin criteria (0.79, 95% CI (0.68, 0.89)), followed by the Berlin criteria (0.66, (0.54, 0.79)), and the ASAS criteria (0.62, (0.49, 0.75)). There was no significant agreement between the presence of radiographic NY criteria and the presence of back pain, physician assessment of IBP, or the IBP criteria. There was also no agreement between physician assessment of IBP and any radiographic change (syndesmophytes or sacroiliitis of at least Grade 2).

Conclusion: We previously demonstrated that patients with axial PsA report less pain than patients with AS. Taken together with the findings of this study, IBP criteria for AS may not provide a good screening tool for axial involvement in PsA.

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The Utility of Serology in Predicting Outcome of Renal Transplantation in Lupus Patients: In a Large Lupus Cohort and Systematic Review

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Objectives: To study the utility of lupus serology as a predictor for kidney graft outcome in: a) a systematic literature review (SLR) and b) the Toronto Lupus Cohort (TLC).

Methods: For the SLR, a literature search in Medline/Embase was performed to identify the articles reporting on the serology at renal transplantation (RT) and on the outcome of RT. Studies were critically appraised using the Newcastle Ottawa Scale. Patients who underwent RT in the TLC were identified and grouped into graft failure and graft survival. The serology was studied in both groups.
Results: Of the 570 references, 565 did not have serological status of the patient or were not relevant to the research question. 5 studies in addition to TLC (n= 77 patients) were included in the SLR. The quality assessment revealed limitations due to small sample size and a short follow up period. The majority of the grafts survived to at least 1 year regardless of the serology results pre transplant which is consistent with the results of the TLC. 32 of 1783 patients in the TLC had a RT. 2 patients had a non-functional graft, 5 patients had graft failure and 25 patients had graft survival. 1 year prior to RT, 40% of the graft failures had positive serology compared to 52% in the graft survival. The time to graft failure was 9.2 ± 6.77 years.
Conclusion: The results of this SLR found that the persistence of serological abnormalities at the time of RT was not associated with graft failure. These results are consistent with the results of the TLC.

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Not Your Typical Atypical Case: Scleroderma Renal Crisis and ANCA Associated Glomerulonephritis in Overlap Syndrome

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Overlap syndrome is an entity that fulfills the diagnostic criteria of two or more autoimmune diseases. The most common connective tissue disease involved is systemic sclerosis (SSc).
We report the case of a 76 year-old Caucasian female with a past medical history significant for polymyalgia rheumatica (PMR), Raynaud's phenomenon, pulmonary hypertension (PASP 45 mmHg) and interstitial lung disease, who presented to hospital with confusion in the context of hypertensive emergency (SBP > 220 mmHg). Her physical examination was significant for facial telangiectasias and periungual infarcts, but no sclerodactyly. Bloodwork showed hemolytic anemia (Hb 128 with rare fragments on smear), thrombocytopenia (Plt 94), and an acute kidney injury (Cr 203, previously normal). As well, she has a history of persistent hypocomplementemia with serology strongly positive for ANA (1:1280), SSA/Ro antibody and mismatched ANCA (P-ANCA+/PR3+).
She was initially treated with plasmapheresis for suspected TTP. However, her ADAMTS-13 assay returned as normal. A renal biopsy showed 1) minimally active pauci-immune focal ANCA-associated glomerulonephritis and 2) thrombotic microangiopathy. Echocardiogram revealed significant progression in her pulmonary hypertension (PASP 90 mmHg). She was ultimately diagnosed with scleroderma renal crisis (SRC) with overlap syndrome predominantly featuring SSc and SLE (SSc/SLE), as well as low grade ANCA-associated vasculitis (AAV). Initial management included pulse steroids, which was transitioned to immunosuppressive therapy with Imuran. Her blood pressure required multiple agents (including an ACE-inhibitor) for control.
Patients with SSc overlap often present with multiple diagnostic and management challenges. Severe pulmonary hypertension is a known complication, which requires prompt treatment with corticosteroids and immunosuppressive drugs, and may also respond to pulmonary vasodilators. SRC is a well-recognized complication of SSc and often manifests with malignant hypertension and acute kidney injury. Recent steroid therapy is a known risk factor, but there is a paucity of

published cases of SRC presenting in patients with SSc/SLE overlap. Pathology from renal biopsy shows a thrombotic microangiopathic process, and is generally unable to differentiate between malignant hypertension and SRC, but is necessary to confirm the diagnosis and may be needed to exclude other causes of acute kidney injury. The mainstay of therapy is ACE inhibitors.

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Passive Coping: A Predictor of Quality of Life in Rheumatoid Arthritis Patients

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Objectives: Patient-reported outcomes, such as functional status and quality of life, have gained increasing importance in clinical practice and research trials as a measure of treatment efficacy in rheumatoid arthritis (RA). While functional status is related to disease activity, the strength of this correlation can vary substantially. It is known that psychosocial factors are related to patient outcomes in chronic disorders such as inflammatory bowel disease and systemic lupus erythematosus. In this study our aim is to determine the effect of (1) coping mechanisms; (2) social support; (3) catastrophizing; (4) pain; (5) depressive symptoms and (7) stress on patients' functional status relative to disease activity in RA. Our goal is to identify biopsychosocial predictors of functional outcome in the RA patients.

Methods: Seventy-two patients with a diagnosis of rheumatoid arthritis from a single center in Kingston, Ontario were evaluated with a demographics questionnaire, a 9-item self-reported depression scale (Patient Health Questionnaire 9, PHQ-9), a 34-item coping scale (Pain Coping Inventory, PCI), a 13-item pain catastrophizing questionnaire (Pain Catastrophizing Scale, PCS), a quality of life (QoL) questionnaire (Health Assessment Questionnaire, HAQ-DI), a stress questionnaire (Perceived Stress Scale, PSS), as well as a physician administered measure of objective disease activity (DAS-28). Multiple regression analysis was conducted to assess predictors of QoL.

Results: Our sample had a low to moderate disease activity (M= 3.17, SD= 1.38) and mild to moderate difficulty in QoL (M= 0.85, SD= 0.63). Perceived stress (r= .35), depression (r= .38), catastrophizing (r= 0.44), disease activity (r = .42) and passive coping (r= 0.44) were all significantly correlated with the HAQ-DI score. Disease activity (β = .37), measured by the DAS-28, and passive coping (β = .37) were predictors of patient QoL, R^2 = .35, adjusted R^2 = .30, $F(5, 67) = 7.04$, $p < .01$. Higher scores of disease activity and more passive coping predicted worse QoL.

Conclusion: Although physician measured disease activity is a predictor of patient QoL, there are a number of psychosocial variables that also contribute to functional outcomes in RA patients. Thus far, we have shown that a passive coping strategy is a negative predictor of QoL. Although perceived stress, depression and catastrophizing were correlated with worse QoL outcomes, they were not predictive of QoL. Therefore, patients' coping strategies are important to consider, and identification of patients with poor coping skills may allow for the implementation of targeted therapies to improve patient outcomes.

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A Longitudinal Pilot Study Investigating Changes in Metacarpophalangeal Erosive Damage and Functional Ability in Patients with Rheumatoid Arthritis Using Magnetic Resonance Imaging and Computerized Segmentation

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Objectives: Studies investigating the relationship between changes in erosive damage and changes in functional ability in patients with rheumatoid arthritis (RA) have largely been limited to conventional radiography and/or semiquantitative evaluation of erosive disease. Early Erosions in Rheumatoid Arthritis (EERA) is a computerized segmentation algorithm that allows for a fully quantitative assessment of bone erosions using magnetic resonance imaging (MRI). The main objective of this longitudinal pilot study was to investigate the association between changes in erosive damage using EERA and changes in functional ability.
Methods: Thirty-five patients from a single rheumatology clinic and satisfying early RA referral criteria were included in this study, which consisted of two study visits approximately 4.5 years apart. The Health Assessment Questionnaire – Disability Index (HAQ-DI) was administered at baseline and follow-up to assess for functional ability. A 1.0T peripheral MRI unit was used to image the metacarpophalangeal (MCP) 2-5 joints of the worst-affected hand, as determined by baseline swollen and tender joint counts. EERA software was then used to evaluate bone erosion volume, in mm3. If a participant had multiple erosions, the volumes were summed to determine the total erosive damage. The non-parametric Spearman's rho (rs) was employed to examine the association between changes in erosive damage and changes in functional ability.
Results: Two participants were excluded from analysis due to missing data. The remaining 33 participants were 75.8% female, 81.8% Caucasian, median (IQR) age 59.0 (47.5, 63.5) years and DAS28 4.31 (3.00, 5.87), with 78.8% prescribed at least one disease-modifying antirheumatic drug (DMARD) and 57.6% prescribed at least one biologic over the study duration. The median (IQR) timespan from baseline to follow-up was 4.4 (4.3, 4.6) years. Median (IQR) total erosive damage at baseline was 13.1 (0.0, 40.3) mm3 and change was 0.1 (-3.1, 9.2) mm3. Median (IQR) HAQ-DI at baseline was 0.5 (0.1, 1.6) and change was -0.1 (-0.3, 0.1). The rs (p-value) was 0.099 (0.585).
Conclusion: In this longitudinal pilot study, there was a very weak, non-statistically significant association between changes in erosive damage and changes in functional ability. The tightly medicated nature of this cohort of RA patients limited the changes observed in both variables and thus different results may have been found in patients with poorly controlled disease. In the future, studies with larger sample sizes and more robust analyses could further elaborate on the relationship between these two critical factors in RA treatment and management.

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A Decision Making Needs Assessment of Youth with Juvenile Idiopathic Arthritis and their Caregivers: Preliminary Results from a Narrative Review

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Objectives: In order to make high quality decisions about juvenile idiopathic arthritis (JIA) treatments, youth and their caregivers should receive evidence-based information about available treatment options, explore which benefits and harms of each option matter most to them, and consider their preferences and values when making decisions. Shared decision making (SDM) is a process that allows youth, their caregivers and health providers to make shared decisions of high quality. The main objective of the present study was to explore the decision making needs of youth with JIA and their caregivers. The secondary objective was to compare identified themes to the OMERACT SDM draft domain core set for adult rheumatology.
Methods: A systematic search was conducted in October 2014 in major electronic databases. Studies were included if they assessed decision making needs of youth with JIA from their own perspectives, and those of their caregivers or health providers. Two independent team members screened the citations and extracted information from the included studies. Themes relating to decision making were extracted and were compared to the OMERACT SDM draft domain core set. A narrative analysis was conducted with the themes.
Results: A total of 44 articles met the eligibility criteria. Twenty-eight of these discussed youths', caregivers' and health providers' information needs. These included information on the risks and benefits of a variety of treatments such as medication, exercise, and complementary health approaches. Pain management, transition to adult care and long term impact of JIA were also felt to be important. Seven studies mentioned the need for youth and caregivers to be involved together in decision making, although some families may wish to remain more passive. Studies revealed that youth values and preferences should be considered, although discussion of treatment options usually reflected clinicians' preferences. Themes were consistent with the OMERACT SDM draft domain core set.
Conclusion: Conclusions: This narrative review shows that there is a need to provide more information to youth and caregivers about a wide variety of JIA treatment options. Effort should be made to ask how youth and caregivers wish to be involved in decision making, and ensure that their values and preferences are considered to make high quality decisions. A further analysis of the themes related to all steps of the SDM process, such as the OMERACT draft domain core set, will be conducted to ensure all needs are explored.

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Ottawa Panel Evidence-Based Clinical Practice Guidelines for Foot Care in the Management of Juvenile Idiopathic Arthritis

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Objectives: To create evidence-based guidelines evaluating foot care interventions for the

management of juvenile idiopathic arthritis (JIA).
Methods: An electronic literature search of the following databases from database inception until May 2015 was conducted: Medline (Ovid), Embase (Ovid), Cochrane CENTRAL, and clinicaltrials.gov. The Ottawa Panel selection criteria targeted studies that assessed foot care or foot orthotic interventions for JIA management among those ages 0 to ≤ 18 years old. The Physiotherapy Evidence Database (PEDro) scale was used to evaluate study quality, of which only high quality studies were included (score ≥ 5). A total of 362 records were screened, resulting in three full text articles and one additional citation containing supplementary information included for analysis. Two reviewers independently extracted study data (intervention, comparator, outcome, time period, and study design) from included studies, using standardized data extraction forms. Directed by Cochrane collaboration methods, the statistical analysis produced figures and graphs representing the strength of intervention outcomes and their corresponding grades (A, B, C+, C, C-, D+, D, D-). Clinical significance was achieved when an improvement of 30% or more between intervention and control groups was present, whereas $p > 0.05$ indicated statistical significance. An expert panel Delphi consensus (≥ 80%) was required for recommendation endorsement.
Results: All included studies were of high quality and analyzed the effects of multidisciplinary foot care, customised foot orthotics, and shoe inserts for the management of JIA. Custom-made foot orthotics and pre-fabricated shoe inserts displayed the greatest improvements in pain intensity, activity limitation, foot pain, and disability (grades A, C+).
Conclusion: The Ottawa Panel recommends the use of customised foot orthotics and pre-fabricated shoe inserts for the management of JIA. Key words: Foot orthotics, Juvenile Idiopathic Arthritis, Physiotherapy, Podiatry, Pediatric rheumatology

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Scurvy: A Multifocal Osteomyelitis Mimic

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A 6yo boy with autism was referred to pediatric rheumatology with hip pain. At the time of consultation his condition had progressed to him being non-ambulatory. There was no history of fever. He looked unwell, had diffuse bruising and a dark brown follicular rash over his periphery and the gingiva were edematous and inflamed. MSK examination was limited due to extreme pain. He was admitted to hospital for further investigations and subsequently developed a low-grade fever, an increasing CRP and ESR, as well as hypergammaglobulinemia. X-rays of the lower extremities were normal. A bone scan demonstrated increased uptake in the left distal tibia and right distal femur. MRI of the lower limbs demonstrated findings concerning for multifocal osteomyelitis including periosteal elevation and enhancement, and areas of non-enhancement in the bone associated with diffuse fascial edema. Considering his extremely limited diet and constellation of symptoms consistent with scurvy, the patient was treated empirically with intravenous vitamin C, before a blood level was ultimately confirmed as undetectable. Concomitant infectious osteomyelitis could not be excluded and the patient was also treated with broad spectrum antibiotics. A bone biopsy demonstrated a neutrophilic infiltrate consistent with osteomyelitis but no evidence of an organism (after 5 days of antibiotics). A thorough primary immunodeficiency work-up failed to demonstrate any abnormalities. The patient's bruising, follicular rash, fever, and general demeanor improved rapidly after starting treatment with Vitamin C and antibiotics. Bone pain and ambulation also improved but at a slower rate.

Discussion: Scurvy is now a very rare condition, but must be considered in populations with severely restricted diets. Compared with the classic radiographic findings (Frankel sign, Wimberger's ring) MRI findings are less well characterized. There have a limited number of recent reports of osteomyelitis mimicking scurvy on MRI but only 4 reports describing the associated bone pathology. In one of these cases, the biopsy demonstrated findings of non-bacterial chronic osteomyelitis with lymphocyte infiltration; this child was treated only with vitamin C with resolution of signs and symptoms. Ascorbic acid (Vitamin C) is known to have a significant impact on immune processes with immunostimulant and anti-inflammatory roles. While we cannot exclude a multifocal infectious osteomyelitis given the empiric treatment with antibiotics in our case, we speculate that vitamin C deficiency, through its effects on the immune system, may contribute to a sterile inflammatory process in bone resulting in imaging and pathology findings that can mimic an infectious osteomyelitis.

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Granulomatosis with Polyangiitis Presenting with Ischemic Intestinal Perforation

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A 27 year old previously healthy man of aboriginal descent was admitted to a community hospital with severe myalgia, acute dyspnea, palpable purpura and elbow nodules. Prior to admission he was experiencing intermittent fevers, sore throat, cough, cervical lymphadenopathy and pain in his heals. Moderate dose prednisone was used to treat his musculoskeletal symptoms including what was thought to be enthesitis. In hospital, he was found to have a creatinine of 156 μmol/L, red blood cell casts and nephrotic range proteinuria.

Four days after admission, the patient began experiencing abdominal tenderness and distention. A none-enhanced abdominal CT scan showed pneumatosis of the majority of his small bowel. He was treated with solumedrol 1 gram intravenously daily and intravenous cyclophosphamide. The patient was transferred to a tertiary care center and underwent emergency laparotomy with significant small bowel resection, leaving only 130 cm of his terminal ilium. Gross pathology revealed necrotized loops of small bowel with multiple small punctuated hemorrhages and on microscopic evaluation transmural infarction with a perivascular infiltrate was observed.

Skin biopsy showed leukocytoclastic vasculitis with negative immunofluorescence. Biopsy of the elbow nodule showed necrobiotic granuloma. Serology revealed normal levels of immunoglobulins and complement, absence of cryoglobulins, negative ANA and P-ANCA/MPO, but highly positive C-ANCA/PR-3. A renal biopsy was obtained showing pauci-immune necrotizing glomerulonephritis. A diagnosis of granulomatosis with polyangiitis (GPA) was made. He continued treatment with solumedrol and was given his first dose of Rituximab shortly after the operation.

Although gastrointestinal manifestations are more common in medium vessel disease such as polyarteritis nodosa, most vasculitides can have gastrointestinal tract involvement. Manifestations can range from edema and hemorrhage to ischemic ulceration and perforation in more severe occlusive disease. GPA is a small-medium vessel, ANCA-associated vasculitis that predominantly has renal and respiratory tract complications and is not frequently associated with gastrointestinal manifestations. There are multiple reports of enteric ischemia occurring

long after the initial presentation. This case demonstrates a rare presentation of GPA with early ischemic intestinal perforation developing at primary diagnosis. In patients with suspected vasculitis and abdominal symptoms, comprehensive clinical reassessment is essential. Gastrointestinal tract involvement caries a poor prognosis and a low index of suspicion is required for early diagnosis and treatment.

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Inflammatory Myopathy in the Setting of Cardiomyopathy

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Approximately 2-3% of patients presenting with acute coronary syndrome (ACS) have Takotsubo cardiomyopathy (TC). We present a case of TC in the setting of necrotizing myopathy (NM).

A 61-year-old female presented to our emergency department with retrosternal chest pain, which was associated with shortness of breath, diaphoresis. She had a 1-day history of proximal muscle weakness and fever. She denied any recent stressful events. Her medical history included bipolar disorder, chronic obstructive pulmonary disease, psoriasis, and peptic ulcer disease. Her home medications included valproic acid, zopiclone, clonazepam, and pantoprazole.

Serum troponin I and CK levels were elevated. Her oxygen saturation was 85% on room air and lung auscultation revealed bilateral crackles. Chest radiography showed no signs of pneumonia and a normal cardiac silhouette. Her blood work results were significant for elevated leukocytes , elevated neutrophils, and increased erythrocyte sedimentation rate. An ACS was suspected and she received aspirin, clopidogrel, intravenous heparin, and a statin.

On the second day of her hospital stay, the patient developed another episode of chest pain and ECG showed diffuse ST elevation extending beyond a geographic territory of a single coronary artery. Her CK level rose but troponin I decreased. Her statin was subsequently discontinued. Serum levels of C-reactive protein and rheumatoid factor were elevated.

To investigate the reason for proximal muscle weakness, electromyography (EMG) and muscle biopsy were performed. EMG revealed a myopathic process involving both quadriceps muscles, with evidence of "myopathic" potentials. Quadriceps muscle biopsy showed early fibre regeneration that was consistent with necrotizing myopathy (NM). For NM, she received prednisone and azathioprine. Over the next few days her muscle weakness significantly improved and serum CK level normalized.

The unusual presentation in this case was the fact that TC occurred in the setting of NM, a subtype of IIM, histologically distinguished by the presence of both necrotic and regenerative fibers in the absence of an inflammatory infiltrate. NM has been reported in association with statin treatment. Although our patient had received a statin, it was discontinued after 4 days when her CK level started to rise. The combination of proximal muscle weakness, elevated muscle enzymes, characteristic EMG and pathological changes, as well as the patient’s response to immunosuppressive treatment is strongly suggestive of the diagnosis of an acute immune-mediated NM. Given the temporal association and the absence of other known causes, we suggest that in our patient NM was the main trigger of TC.

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Comparing Patient Satisfaction with Collaborative-Based and Physician-Based Care in a Rheumatology Clinic

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Objectives: Patient satisfaction has increased with pharmacist intervention in general outpatient clinics and with nurse-led care in rheumatology clinics; however, there is no known data demonstrating increased patient satisfaction for pharmacist care in a rheumatology clinic. The aim of this study was to describe and compare patient satisfaction with two different types of care, a pharmacist-physician collaborative model and physician alone model in a rheumatology clinic setting.
Methods: A cross sectional survey of inflammatory arthritis patients seen during a follow-up visit in Edmonton, Alberta was conducted over a 10-week period. Patient satisfaction was measured using a modified version of the validated Leeds Satisfaction Questionnaire, which uses a 5-point Likert scale to measure 6 dimensions of satisfaction, and compared between two care groups: physician-alone (PA) and pharmacist-physician collaborative care (CC). A sub-group analysis of patient satisfaction between first-visit and subsequent-visit patients in the collaborative care (CC) group was also performed.
Results: A total of 75 patients completed the questionnaire (15 in the CC and 60 in the PA group). The average age of respondents was 54 years and the majority were female. The mean score for satisfaction across the 6 dimensions was 4.63 in the CC group and 4.42 in the PA group ($p=0.09$). Patient satisfaction in the CC group was consistently higher across dimensions and both groups demonstrated the highest average score in Technical Quality and Competence (CC: 4.75, PA 4.63). No difference was noted for between participants seen for the first time compared to those seen 2 or more times by the pharmacist.
Conclusion: Both care groups were highly satisfied in each dimension indicating that patients were satisfied overall with the care they receive. Our findings support the role of pharmacists using a collaborative care approach to care for patients in rheumatology clinics.

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Clinical Examination of the Temporomandibular Joint; A EuroTMjoint Initiative

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Objectives: Arthritis of the temporomandibular joint (TMJ) in patients with Juvenile Idiopathic Arthritis (JIA) is increasingly recognized. In the last decade, studies report that the frequency of TMJ involvement in JIA patients is between 45-100% depending on the population examined and the diagnostic tool used. The gold standard to diagnose TMJ arthritis is use of Gadolinium enhanced MRI. Clinical symptoms have been shown to be unreliable for diagnosis of TMJ arthritis, however their usefulness in monitoring disease course needs to be determined. This study was undertaken by the Clinical Recommendation group of euroTMjoint, an international network established in 2010 to enhance multidisciplinary, multicenter TMJ research in JIA,. This study describes the reliability and reproducibility of a clinical tool that can be implemented in any practitioner.
Methods: A clinical tool was developed based on the results of a Delphi study and expert panel. The examined tool items were: TMJ pain reported by patient; TMJ tenderness on palpation; mandibular deviation; maximal mouth opening; vertical incisal overlap; frontal facial asymmetry; facial profile. 33 patients with JIA were examined eight times, twice by four independent examiners; 2 pediatric rheumatologists and 2 orthodontists with experience in

clinical examination. An independent experienced orthodontist instructed all examiners on the use of the recommendation tool. The examiners were blinded to each other's results.
Results: The time to perform the examination differed significantly between investigators irrespective of their professional background (median 89-179 sec, $p<0.0001$), however all examiners were able to perform the exam within the 3 minutes limit. The intra- and inter-agreement was lower for questions, such as absence or present of pain, than objective measurements. Comparing pediatric rheumatologists with the more experienced orthodontists revealed a high reproducibility for the measurement items maximal mouth opening and vertical incisal overlap (Spearman rho respectively 0.81 and 0.55), indicating these items can be used by inexperienced examiners after instructions. Frontal facial asymmetry showed the least reproducibility among the items (kappa 0,23). ced orthodontist instructed all examiners on the use of the recommendation tool. The examiners were blinded to each other's results.
Conclusion: Clinical signs and symptoms of TMJ arthritis remain controversial for diagnostic purposes; however this study does show a fair agreement for all items and a moderate to almost perfect agreement for the measured items. This study shows the possible applicability of this tool in the rheumatology clinic during the course of the disease.

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The Six-Minute Walk Test as a Patient Performed Measure of Rheumatoid Interstitial Lung Disease

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Objectives: Interstitial lung disease (ILD) is a devastating extra-articular manifestation of rheumatoid arthritis (RA). It is unknown if the six-minute walk test (6MWT) provides information on ILD severity or progression. The purpose of this study was to correlate walking distance and oxygen desaturation during the 6MWT among patients with RA-ILD with clinical parameters and PFTs at baseline and over time.
Methods: We retrospectively evaluated 23 RA-ILD patients who attended the University Health Network lung disease clinic between January, 2012 and November, 2014. All patients had PFTs, CT scans of the chest, and a 6MWT with Borg dyspnea scores, which is a measure of perceived exertion, as part of routine care. Means and standard deviations were calculated for continuous variables. For the baseline measurement, the follow-up measurement. and the change over time, we calculated Pearson correlations between percent predicted 6MWT distance (%6MWTD) and drop in oxygen saturation (SpO2) and percent predicted FVC (%FVC) and DLCO (%DLCO). We used univariate regression analyses to test associations between clinical (age, RA and ILD disease duration) and physiologic variables (%FVC, %DLCO, %6MWD, and SpO2 drop).
Results: The mean age of the patients was 63 years; seventeen (74%) were women and 14 (61%) had never smoked. The mean %FVC was 72 ± 19.3% and mean %DLCO was 67 ± 15.4%. The mean distance walked and % predicted were 394 ± 125.4m and 85 ± 23.2% respectively. Mean drop in SpO2 after the 6MWT was 5.14 ±5.2%. We found no associations between 6MWT parameters and age, sex, duration of ILD or RA. At baseline and follow-up, we found no significant correlations between %6MWTD and %FVC, however, there was a significant

correlation between Sp02 and %DLCO at baseline and between Sp02 and %FVC at follow-up. From baseline to follow up visit, the mean change in %FVC was 1.9 (95% CI: -2.3, 6.0, p=0.36), mean change in %6MWTD was 3.0 (-3.2, 9.2, p=0.33), mean change in %DLCO was 1.6 (-1.2, 4.3; p=0.26), and mean change in Sp02 was 0. (-0.87,2.14, p= 0.39). Over the time between the baseline and follow up visits, we found correlations between changes in %6MWTD and %FVC (0. (0.29, 0.83, p= 0.002)) and changes in %6MWTD and %DLCO (0.42 (0, 0.72, p= 0.051)), but none with changes in drop in oxygen saturation.

Conclusion: In addition to PFTs, the 6MWT may be a meaningful tool for assessing disease progression in patients with RA-ILD.

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Patient's Experience of the Diagnosis and Management of Psoriatic Disease

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Objectives: Awareness among patients with psoriasis and psoriatic arthritis (PsA) of the disease outcomes and the available treatment options help disease management. We aimed to explore the patients' disease knowledge and experiences in interacting with the health care system across Canada.

Methods: Based on recommendations from our advisory group comprising clinicians, methodologists and patient-partners, questions for focus groups with patients having psoriasis or PsA were developed. Patients from across Canada were recruited with the help of physicians and the Canadian Psoriasis Network. Focus groups were conducted by trained research associates. The focus groups were recorded, transcribed, and analyzed by 2 experts and key themes identified.

Results: 5 focus groups involving a total of 28 patients (10 males, 18 with PsA, 10 psoriasis without PsA) were conducted and data saturation reached. The following themes were identified- (1) Diagnosis: Patients' recollections of their diagnostic journey were varied. Some patients indicated at least some difficulty with getting a definite diagnosis. Access to specialists and wait times were noted as problems to being diagnosed. (2) Knowledge about PsA: There is a perception among the patients that PsA is a chronic condition marked by a lack of knowledge on both the patients' and healthcare professionals' part. (3) Benefits of early diagnosis: Patients did not readily acknowledge the benefits of early diagnosis. Some suggested that in their years of living with psoriasis and PsA, they see a change in how they are managed and this may assist with earlier diagnosis in the future. (4) Perceptions of the healthcare system/care received: Patients perceive that their care is often fragmented and rushed. A holistic approach to their psoriasis and its associated comorbidities was lacking. Patients with PsA also noted a lack of co-ordination between specialities (dermatology and rheumatology), and a lack of involvement of their primary care physicians in their psoriasis/PsA care. Most patients felt that nurses were helpful, knowledgeable, and approachable and understood the patient perspective better. Patients saw a role for electronic medical monitoring. (5) Disease management: It was generally felt that management of their disease was difficult. Topical treatments for psoriasis were not very effective. Finding the right physician made a big difference. Access to specialists and medications was identified as problems.

Conclusion: This qualitative study has identified themes that would have to be addressed to improve the quality of care of patients with psoriasis and psoriatic arthritis. Supported by a CIORA grant.

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Quality of Cardiovascular Care in RA: Assessing the Current State and Identifying Areas for Improvement

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Objectives: Cardiovascular disease (CVD) is a leading cause of death for patients with rheumatoid arthritis (RA). The reasons for this are complex and involve premature atherosclerosis as a consequence of chronic inflammation. The high mortality rate seen indicates a need for proactive screening and management of CVD risk factors. We recently developed a set of 11 Quality Indicators (QIs) for RA based on best clinical practices through a rigorous multi-step process. The objective of this study was to test the QIs in clinical practice and to report on QI performance.

Methods: Medical charts for RA patients (early disease or biologic-treated) followed at a tertiary care centre were retrospectively reviewed by 2 of 3 reviewers using a standardized abstraction form. Baseline cardiac risk factors were evaluated and a systematic assessment of performance on the 11 QIs over a two-year period was completed. Performance on the QIs is reported as a percentage pass rate.

Results: 170 charts were reviewed (107 early disease and 63 biologic-treated). The most frequent CVD risk factors present at diagnosis (early disease) and biologic start (biologic-treated) included hypertension (26%), obesity (25%), smoking (21%) and dyslipidemia (15%). A Framingham Risk Score could be calculated on 44% of eligible patients and 34% of these were at intermediate or high risk of CVD events. Performance on the CVD QIs was highly variable. Areas of low performance (<10% pass rates) included documentation of a formal CVD risk assessment, communication to the primary care provider that patients with RA are at increased risk of CVD, body mass index documentation and counselling if overweight, communication to a primary care provider about an elevated blood pressure, and documentation of discussing risks and benefits of anti-inflammatories in patients at CVD risk. Rates of diabetes screening and lipid screening were 67 and 69% respectively. The area of highest performance was observed for documentation of intent to taper corticosteroid (98-100% for year 1 and 2 respectively).

Conclusion: In this tertiary care setting, patients had a high burden of cardiovascular risk factors and we identified important gaps in CVD risk management, which highlight the need for quality improvements. Key targets for improvement include coordination of care including communication with the primary care provider about the elevated CVD risk in RA. Improvements should also be made in counselling patients about exercise, smoking cessation and lifestyle modifications to ensure a healthy weight.

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Measuring the Rheumatologist Workforce in Canada: Stand Up and Be Counted!

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Objectives: To characterize the practicing rheumatologist workforce, the Canadian Rheumatology Association (CRA) launched the Stand Up and Be Counted survey in March 2015.

Methods: The Stand Up and Be Counted survey was developed following a literature review of existing workforce studies to identify gaps in knowledge about rheumatologist workforce characteristics, and pre-tested in English and French. The final survey consisted of 63 questions to elicit demographic and practice information, in particular the allocation of time for clinical care, and with specific questions on provision of care to rural and remote communities. The survey was distributed to the CRA membership, with additional rheumatologists who were non-CRA members identified through the Royal College of Physicians and Surgeons of Canada, provincial licensing bodies, and snowball recruitment from other CRA members. We applied the reported median proportion of time devoted to clinical practice to provincial estimates of rheumatologist numbers (Canadian Medical Association data) to determine the number of rheumatologist full time equivalents per 75,000 population.

Results: The survey was sent to 697 individuals of whom 525 were expected to be in active practice (470 adult, 55 pediatric) based on CRA membership information. Of the 409 respondents, 54 were excluded as they were not currently in clinical practice, yielding a sample of 355 rheumatologists (response rate of 68%). Of these 304 were adult, and 51 pediatric rheumatologists (response rates of 65% and 93% respectively). The median age was 50 years and nearly a third (114, 32%) planned to retire within the next 10 years. Sixty-one percent were affiliated with a university and the remainder were in community practice. The majority of the respondents' caseloads were comprised of patients with inflammatory arthritis (70%) and the median number of ½ day clinics offered per week was 6. The median number of new patients and follow-ups seen per week were 10 and 45 respectively. The majority of rheumatologists' time was devoted to clinical practice (70%). There are between 0 and 0.71 full-time rheumatologists per 75,000 in each province. This represents a deficit of between 0.5-81 full time rheumatologists to meet accepted ratios, depending on the province/territory.

Conclusion: The CRA recommends 1 rheumatologist per 75,000 population. The results of the Stand Up and Be Counted Survey highlight a current shortage of rheumatologists in Canada affecting all provinces and territories that may worsen in the next 5-10 years as 1/3 of the workforce has plans to retire unless new trainees are recruited and retained.

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Key Performance Indicators for Evaluation of Centralized Intake Systems for Osteoarthritis and Rheumatoid Arthritis Healthcare Teams in Alberta

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Objectives: Centralized intake is a system to ensure timely access to appropriate health services. It incorporates elements of waitlist management and single entry models, which are key strategies to healthcare waitlist management. Given the growing burden of rheumatoid arthritis (RA) and osteoarthritis (OA) developing a provincial centralized intake strategy for optimizing access to care and treatment in these conditions is a priority. The aim of this study is to develop a set of key performance indicators (KPIs) to evaluate centralized intake systems for OA and RA, which is the first step in defining an optimal intake system.

Methods: KPI development occurred over three phases. During Phase 1, a series of face-to-face meetings were held to obtain stakeholder input on candidate KPI themes that were aligned with quality of care dimensions (appropriateness, accessibility, acceptability, efficiency, effectiveness, and safety) at the patient, provider and system level. During Phase 2, an integrative literature review was conducted to ensure the KPIs were based on best practices and harmonized with any existing measures. In Phase 3, a 3-Round modified-Delphi consensus procedure was conducted using a platform called ExpertLens. During Round 1 participants were asked to rate the validity, feasibility, importance and likelihood of KPI use. In Round 2 participants had the opportunity to discuss the results of Round 1 online and/or at an in-person meeting following which participants re-rated the KPIs during the final round online. KPIs that were rated as valid and important (median ratings ≥ 7 on a 9-point Likert scale) were included in the final set.

Results: During Phase 1 and 2, 25 KPIs were specified and then submitted to panelists in Phase 3. Panelists included patients, healthcare professionals, managers, and researchers and 27 of the invited 28 participated in the modified-Delphi (96%). During Round 2, an in-person meeting was held to review the results of Round 1 voting. Participants removed 3 KPIs and suggested an additional 6. Twenty-eight KPIs were included in final voting and all were rated as valid and important for inclusion in the final set including 9 KPI specific to OA, 10 to RA and 9 relating to centralized intake processes for both conditions.

Conclusion: Arthritis stakeholders identified and defined 28 KPIs that should be used in quality improvement efforts when evaluating centralized intake for OA and RA. The KPIs measure five of the six dimensions of quality and are relevant to patients, practitioners and health systems.

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Economic Evaluation of Lupus Nephritis in an International Inception Cohort: Comparing the Hospitalization, Medication, Dialysis, and Procedure Costs of those with and without Nephritis

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of Public Health, Cambridge); Yvan St. Pierre (McGill University, Montreal); Vern Farewell (Cambridge Institute of Public Health, Cambridge); Ann Clarke (University of Calgary, Calgary); Systemic Lupus International Collaborating Clinics Investigators (SLICC, Pittsburgh)
Objectives: Little is known about the long-term costs of lupus nephritis (LN). The annual and long-term healthcare costs were compared between SLE patients with and without LN.
Methods: Patients from 32 centres in 11 countries were enrolled in the Systemic Lupus International Collaborating Clinics (SLICC) inception cohort within 15 months of diagnosis and provided annual data on renal function, hospitalizations, dialysis, and utilization of medications and selected procedures. LN was diagnosed by renal biopsy or fulfillment of the American College of Rheumatology (ACR) SLE classification criteria renal item. Renal function was also assessed annually based on estimated glomerular filtration rate (eGFR) or proteinuria (ePrU). Annual health resource utilization was costed using 2015 Canadian prices. Annual costs associated with renal function states were obtained from multiple regressions adjusting for gender, age, race/ethnicity, disease duration, smoking, and alcohol consumption. Ten-year cumulative costs were estimated by determining annual costs associated with each renal function state and then forecasting the expected duration in each state. Durations were estimated using a relative risk regression model.
Results: 15 patients participated, 89.2% females, 48.9% Caucasian, mean age at diagnosis 35.2 years (SD 13.4), mean disease duration at enrollment 0.47 years (SD 0.35), and mean follow up 6.1 years (SD 3.3). LN was diagnosed in 39.4% over follow up. Predicted annual costs (after adjustment using regression) were markedly higher in patients with end-stage renal disease [$15947 (95% CI, $10721, $21172)], compared to those with an eGFR > 60 ml/min [$1811 (95% CI, $1214, $2407)] or ePrU < 0.25g/day [$1780 (95% CI, $1176, $2384)]. Ten year cumulative costs stratified by baseline renal function state were calculated by multiplying the annual costs associated with each state by the expected duration in that state. Ten year cumulative costs were greater in those with end-stage renal disease at baseline [$135401 (95% CI, $89023, $181778), compared to those with a baseline eGFR > 60 ml/min [$ 14241 (95% CI, $5782, $22701) or ePrU < 0.25 g/day [$14274 (95% CI, $5954, $22594)].
Conclusion: Patients with impaired eGFR or elevated ePrU and LN incur higher annual and cumulative costs than those with normal renal function. By estimating the expected duration in each renal function state and incorporating associated annual costs, disease severity at presentation can be used to anticipate future healthcare costs, critical knowledge for cost effectiveness evaluations of novel LN therapies.

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CRUS Control: A Retrospective Analysis of a Canadian Rheumatology Ultrasound Clinic: Preliminary Results

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Objectives: Musculoskeletal Ultrasound (MSK US) has become increasingly recognized in diagnosing and assessing response to treatment in rheumatic disease. The use of MSK US by Canadian Rheumatologists has historically lagged behind many other countries. The aim of this

study is to demonstrate proof that a Canadian Rheumatology MSK US clinic provides value by impacting the diagnostic and therapeutic management of patients.
Methods: A retrospective analysis of electronic medical records of patients referred to a Rheumatology MSK US clinic in Vancouver, BC. 153 patients (37% male), with a mean age 53 (range 20 – 88) seen at the MSK US clinic between May 2014 and June 2015. All patients referred to this clinic had been assessed by their primary Rheumatologist and given a diagnosis. Referrals generally were to assess the presence of inflammatory arthritis, response to treatments or to for joint aspiration/injections. Using an Esaote MyLab Twice ultrasound machine patients had focused ultrasound exams to assess for inflammation (presence of power Doppler signal, synovitis, or effusions), crystal arthropathy, joint damage (erosions or cartilage irregularity) or presence of osteophytes. This information, taken with the clinical context provided from the referring Rheumatologist, would help guide management with suggestions to either escalate, reduce or to not alter therapy. Therapeutic options included the adding or intensifying of disease modifying anti-rheumatic drugs (DMARDs), prednisone, biologic therapies or joint injections.
Results: The observed difference was that in 55.5% of cases there was a change in management (41.8% escalation, 13.7% reduction) with no change in management 44.5% of the time. We applied a two-sided exact McNemar's test to assess whether rates of escalation differed statistically from rates of de-escalation, and found that indeed the difference in rates is highly significant (p-value<0.001).
Conclusion: This is to our knowledge, the first proof that a Canadian MSK US clinic impacts patient care. Interim analysis shows that in over half of cases there is a change in management, with a significant proportion of those changes resulting in an escalation of treatment for patients referred to the MSK US clinic. Further analysis will identify what types of treatment modalities (i.e. DMARDs, steroids, injections or biologics) were implemented. In addition, a satisfaction survey from referring Rheumatologists will assist in gaining further insight on the impact of this clinic on participating physicians' practices.

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Complications of Inflammatory Arthritis in First Nations and Non-First Nations Populations of Alberta, Canada

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Objectives: With markedly improved control of the acute effects of inflammatory arthritis, the major causes of morbidity and premature death now arise from the complications of chronic inflammation. Alberta's First Nations (FN) population has an increased prevalence of rheumatoid arthritis (RA), ankylosing spondylitis (AS) and psoriatic disease (PsD includes psoriasis and psoriatic arthritis) relative to the non-FN population. These conditions are reported to be more severe in FN which may result in higher rates of inflammatory complications. Our objective was to compare incidence rates of recognized complications of inflammation, namely cardiovascular disease (CVD, including myocardial infarction, stroke, venous thrombotic events), hospitalized infections, osteoporotic hip fracture, and malignancy (lymphoma, breast, colon), and conditions newly hypothesized to be secondary to chronic inflammation (diabetes, chronic obstructive pulmonary disease, COPD) in FN and non-FN populations.

Methods: ICD-9-CA and ICD-10-CM codes from population-based healthcare administrative data (physician billing claims and hospitalizations, years 1993 to 2011) were used to define incident cohorts of patients with RA, AS, and PsD using validated definitions. FN identity was determined from the Alberta Health Care Insurance Plan Registry File. Complications were determined using validated algorithms of ICD-9-CA and ICD-10-CM codes, with prevalent cases excluded. Incidence rates of complications were calculated for each disease cohort overall (per 1,000 person-years), and stratified by FN status to calculate the incidence rate ratio.
Results: The disease cohorts include 27,587 persons with RA, 5,120 persons with AS and 4,279 persons with PsD, with FN representing 6.1%, 5.0% and 3.7% of the cohorts respectively. Incidence rate ratios comparing rates in First Nations and non-First Nations populations for the complications of interest all included the null value. Hospitalized infection rates (per 1,000 person-years) were 29.7 in RA, 22.4 in PsD and 19.8 in AS. The incidence rate for CVD (per 1,000 person-years) was 14.0 in RA, 10.4 in PsD and 8.3 in AS. COPD occurred at a rate (per 1,000 person-years) of 12.0 in RA, 11.2 in PsD and 6.6 in AS. All event rates for osteoporotic hip fracture, malignancy and diabetes were <6.5/1,000 person-years.
Conclusion: Hospitalized infection rates and CVD are the most common complications of inflammation in the population with inflammatory arthritis. There were no significant increases in rates of complications in FN persons compared to non-FN in our population-based cohort.

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Comparison of Health Service Utilization Costs between Aboriginal and Non-Aboriginal Patients with Rheumatoid Arthritis Requiring Biologic Therapy

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Objectives: Logistical issues and poor cultural environments in tertiary care create barriers to specialized care for Aboriginal patients with rheumatoid arthritis (RA). Aboriginal patients are thus more likely than non-Aboriginal patients to see a primary care provider and less likely to see a rheumatologist for their RA care, and may result in differences in disease management and clinical outcomes. We used health services data to estimate the effect of these differences reflected in health system costs.
Methods: The Alberta Biologics Pharmacosurveillance Program (ABioPharm) is a longitudinal RA cohort study, linked to population-based administrative databases. These databases capture hospitalization, emergency room, and outpatient clinic visits which have an associated clinical modifier group, and physician visits which have an associated claim cost, from which health service utilization costs are estimated. Given the skewed nature of the data and that it may contain many zero values, we used a two-part modeling strategy for mixed discrete-continuous outcomes. In the first part, a binary choice model was estimated for the probability that the patient has had (or not had) health costs (dichotomous). In the second part, a generalized linear model with gamma family (with propensity score analysis) was used to estimate the difference in health costs between Aboriginal and non-Aboriginal groups, conditional on a cost having been incurred. Costs were adjusted for inflation to 2011/2012 using the Canadian Consumer Price Index from Statistics Canada.
Results: The cohort included 1,545 patients (n=83 Aboriginal) with 8,145 person-years of follow-up. In the two-part model, cost estimates for Aboriginal patients showed a numerical trend to lower hospital (model coefficient -$5,406; 95%CI -11,552 to 470), outpatient clinic

(model coefficient -$1,037; 95%CI -2,300 to 226) and physician visit (model coefficient -$1,072; 95%CI -2,986 to 843) costs, but with higher emergency room costs (model coefficient $660; 95%CI -38 to 1,357) compared to non-Aboriginal patients, although not reaching statistical significance. Similar estimates for RA-related costs were determined.
Conclusion: Health service utilization costs did not vary between Aboriginal and non-Aboriginal patients, although with limitations of sample size. Differences in health service use may explain disparate clinical outcomes observed in our cohort, which could be remedied by increased collaboration with primary care providers, and creating health care environments that deliver culturally competent care.

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Imaging Modalities for the Diagnosis and Disease Activity Assessment of Takayasu's Arteritis: A Systematic Review and Meta-Analysis

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Objectives: Takayasu's arteritis (TAK) is a rare large vessel vasculitis predominately affecting young women. Early detection of disease activity may reduce the risk of vascular complications. The objective of this study was to determine the effectiveness of imaging modalities for the early diagnosis and the assessment of disease activity in patients with TAK.
Methods: We searched MEDLINE and EMBASE for articles including TAK patients undergoing various imaging modalities for the purpose of diagnosis or to assess disease activity (by physician opinion or various published scores/indices). We excluded case reports and reviews. Two authors independently screened articles. A random effects model with inverse-variance weighting was performed.
Results: From the 932 citations screened, 66 studies enrolling 1934 participants met our inclusion criteria. Most of the studies were of small sample size, cross-sectional, single-centre design and poor methodological quality. The studies were highly variable with respect to control groups and outcome measures. For diagnosis, there were 8 sonography and 6 Magnetic Resonance Angiography (MRA) studies. All studies included subjects with an established diagnosis of TAK (did not assess test performance in the setting of subjects with a suspicion of TAK). For sonography studies, diffuse intima-media thickening of the supraaortic vessels ranged in prevalence from 69-100% in TAK subjects compared to 0% in healthy controls (N=3 studies) and systemic lupus erythematosus (N=1 study). Sonography also demonstrated close agreement to conventional angiography in demonstrating stenosis of the cervicocranial arteries (N=4 studies). Luminal defects detected by MRA correlated well with conventional angiography, but tended to overestimate stenosis. One study showed that MRA was not able to differentiate TAK from atherosclerosis. For assessing disease activity, 8 studies investigating PET were meta-analyzed. Pooled estimates for sensitivity and specificity were as follows: 0.84, 95% CI 0.76-0.91, and 0.71, 95% CI 0.62-0.80, respectively. Studies of MRA and Computed Tomography Angiography (CTA) had conflicting results regarding their accuracy at detecting active disease.
Conclusion: Due to the small sample size of available studies, their poor methodologic quality and the lack of a validated gold standard, the accuracy of imaging for the diagnosis and assessment of disease activity in TAK remains unclear.

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Cardiovascular Risk Prevention in a Canadian Population of Patients with Giant Cell Arteritis

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Objectives: Giant Cell Arteritis (GCA) is associated with an increased prevalence of traditional cardiovascular risk factors and cardiovascular events. Studies regarding the management of cardiovascular disease in GCA are lacking. The objectives for this study is to report cardiovascular risk factors and complications and describe adherence to guidelines for prevention of cardiovascular events in a Canadian population with GCA.
Methods: This is a single centre retrospective cohort of all patients with GCA seen at the St. Joseph's Health Care rheumatology clinic in London, Ontario between 1998 and 2015. Patients were identified by diagnostic codes. Cardiovascular complication (CVC) was defined as a composite outcome (any of acute coronary syndrome, stroke, transient ischemic event, or severe peripheral vascular disease requiring surgical intervention). Adherence to recommended primary and secondary prevention for CVD was based on the 2012 Canadian Cardiovascular Society guidelines.
Results: 42 patients have been included: 28 female (67%) and 14 males (33%) with a mean age of 70 (SD 6.8) years and median follow-up of 34 (range 4-98) months. At diagnosis, a large proportion of patients had cardiovascular risk factors: hypertension (66%), hyperlipidemia (52%), history of current or prior cigarette smoking (33%) and diabetes (4%). 10% had a prior CVC. All patients received high dose prednisone at a median dose of 50 (range 30-100) mg and 33% were previously receiving or started on an antiplatelet or anticoagulant drug (AP/AC). Over the follow-up period an additional 12% were started on AP/AC and 67% received an immunosuppressant in combination with prednisone. At last follow-up, 69% remained on prednisone with a median dose of 8 mg (range 3-80) mg. 11 patients (26%) suffered a CVC (5 stokes, 3 acute coronary syndromes and 3 severe PVD). 5 patients died (12%). 28% of subjects with a CVC did not receive the recommended AP/AC or lipid-lowering agents. Cardiovascular risk stratification was performed in 62% of subjects with no CVC; of these, 19% were not on a lipid-lowering agent when indicated.
Conclusion: The majority of GCA patients have at least 2 traditional cardiovascular risk factors at baseline. CVC was common after diagnosis of GCA. Management of cardiovascular risk factors was suboptimal. This study suggests that quality improvement initiatives are needed to identify gaps in the management of cardiovascular risk and improve outcomes in GCA.

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Cardiovascular Disease in the Canadian Early Arthritis Cohort

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Objectives: Rheumatoid Arthritis (RA) is associated with an increased risk of cardiovascular disease (CVD). The objective of the present study was to estimate CVD incidence and its predictors in a Canadian Early Inflammatory Arthritis (EIA) Cohort.
Methods: The Canadian Early Arthritis Cohort (CATCH) is a multicentre, prospective inception

cohort of patients with EIA. Cardiovascular disease (CVD) was defined as an acute coronary syndrome, percutaneous or surgical intervention for coronary artery disease, stroke, transient ischemic attack, peripheral vascular disease requiring surgical intervention or death secondary to CVD. Pre-existing diagnoses of CVD, risk factors and medications for CVD were collected at baseline by physicians. Incident CVD events and cardiac medications after study enrollment were self-reported by patients. To validate self-reported variables, a chart review was performed for 141 CATCH patients from a single site (London, Ontario). There was moderate to high agreement between self-reported CVD events and patient medical records (Cohen's kappa = 0.66). Stepwise logistic regression was used to identify sociodemographic, traditional risk factor and arthritis-related predictors for CVD.

Results: 2652 patients were enrolled in CATCH over the study follow-up period from April 2007 through May 2015. There were 55 new first CVD events reported throughout the follow-up period. Cumulative incidence of CVD over the study period was 2.2% (95% CI:1.71-2.88). Independent predictors of CVD were age (OR 1.27; 95%CI: 1.01-1.59 for every 10 year increase), male gender (OR 2.04; 95% CI: 1.20-3.45), hypertension (OR 2.60; 95% CI: 1.46-4.62) and the use of cyclooxygenase-2 inhibitors or other non-steroidal anti-inflammatories (NSAIDs), except naproxen (OR 3.41; 95% CI: 1.93-6.02). Duration of arthritic symptoms was the only arthritis-related factor significantly associated with CVD incidence (OR 1.06; 95% CI: 1.03-1.10 for every 1 month increase). Disease activity and functional scores, erosive disease, autoantibodies and elevations in inflammatory markers were not significantly associated with CVD. Less than 25% of subjects with CVD reported taking aspirin or lipid-lowering drugs during the follow-up period.

Conclusion: Results of this large Canadian multi-centre study of patients with EIA treated in usual care showed that cardiovascular events in EIA were independently associated with traditional CVD risk factors, duration of symptoms prior to enrollment and the use of NSAIDs other than naproxen.

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Predictors of Long-Term Retention of Anti-TNF Treatment: An Analysis from a Prospective, Observational Registry.

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Objectives: Previous studies have shown significant differences in treatment retention between anti-TNF agents. Furthermore, data from the literature suggest that some factors (e.g. concomitant methotrexate use) may be associated with improved retention. This analysis was aimed at comparing the long-term retention of infliximab and golimumab and identifying independent predictors of retention in patients with rheumatoid arthritis (RA) followed in Canadian routine care.

Methods: BioTRAC is an ongoing, prospective registry of RA, ankylosing spondylitis, or psoriatic arthritis patients initiating treatment with infliximab or golimumab. In this analysis, RA

patients treated with infliximab (enrolled since 2002) or with golimumab (enrolled since 2010) were included; patients not discontinued with a follow-up of <18 months were excluded. Independent predictors of long-term retention (≥18 months), were assessed with multivariate logistic regression. Receiver operator curve (ROC) analysis was used to determine the optimal CDAI cut-off for long-term retention.

Results: 972 patients were included with mean (SD) age of 55.9 (13.8) years and disease duration of 8.6 (9.1) years at baseline. The majority were biologic naïve (94.5%), treated with infliximab (84.8%), and received a concomitant DMARD (88.5%) at baseline; 35.9% received corticosteroid treatment. Mean (SD) baseline disease parameters were: CDAI: 35.3 (17.5); HAQ: 1.6 (0.7); swollen joint count (0-28): 10.3 (6.8); tender joint count (0-28): 12.0 (7.9); patient global (cm): 6.0 (2.5); physician global (0-10): 6.4 (2.1). Six hundred (61.7%) patients received treatment for ≥18 months. Univariate analysis identified age [OR(95%CI): 0.99 (0.98-1.00)], disease duration [0.97 (0.95-0.99)], enrolment year [1.10 (1.06-1.15)], male gender [0.68 (0.50-0.94)], golimumab vs. infliximab use [2.24 (1.58-3.19)], biologic naiveté [0.58 (0.33-1.01)], and baseline DMARD use [0.54 (0.36-0.80)] as potential predictors of retention (P<0.100). Baseline corticosteroid use, CDAI, and HAQ did not have an impact. Upon multivariate adjustment, older age [0.98 (0.97-1.00)] and male gender [0.50 (0.29-0.85)], were associated with significantly lower odds of discontinuation, while more recent enrolment with higher odds [1.36 (1.20-1.54)]. Lower disease activity at 6 or 12 months was associated with significantly (P<0.001) higher probability of long-term retention. ROC curve analysis identified a CDAI score at 6 months ≤15.7 (AUC=0.652;P<0.001) and a score at 12 months ≤14.6 (AUC=0.679;P<0.001) as most accurately predicting long-term retention.

Conclusion: This analysis has shown that retention of infliximab and golimumab in real-world is comparable. Age, gender, and enrolment year, possibly signifying differences in patient preferences or changes in clinical practice, as well as CDAI score of ≤15 at 6-12 months were identified as significant independent predictors of long-term retention.

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Can we use Bone Turnover Markers as Targets for Antiresorptive Treatment in Postmenopausal Osteoporosis? An Analysis from the DECIDE and STAND Clinical Trials

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Objectives: Bone turnover markers (BTMs) respond much quicker than BMD as an indicator of therapeutic response in osteoporotic patients; however, it remains unclear when and how best to evaluate treatment response using BTMs. Denosumab (DMAb) has a dynamic BTM profile over the 6-mo dosing period (i.e., reduction in turnover with release of inhibition at the end of the dosing interval). This analysis assessed the use of potential target values for serum C-telopeptide of type I collagen (CTX) and procollagen type I N-terminal propeptide (P1NP) to explore guidance to clinicians for monitoring postmenopausal women with osteoporosis (PMO) during treatment.

Methods: BTMs measured at baseline in treatment-naïve PMO entering FREEDOM, a large randomized, placebo-controlled study of DMAb (Cummings NEJM 2009), were used to derive threshold values at the 5th percentiles of the observed distributions. The relevant values for serum CTX (N=7594) and P1NP (N=1023) were 0.2 and 25.8 ng/mL, respectively. These BTM

target values were applied to study populations of DECIDE (Brown JBMR 2009) and STAND (Kendler JBMR 2010) enabling evaluation of a population-based assessment of BTM target values. DECIDE (N=1189) and STAND (N=504) were phase 3, randomized, double-blind, double-dummy studies comparing the efficacy and safety of DMAb (60 mg SC Q6M) with alendronate (ALN) (70 mg PO QW) in treatment-naïve PMO or PMO already receiving ALN, respectively. The percentage of subjects in each treatment group with BTMs below the predefined target values was evaluated mid-cycle at mo 3 after the 1st DMAb dose , which also enabled trough values for ALN, and re-evaluated at mo 9. Subjects with BTM values below predefined targets at baseline were excluded.
Results: At baseline 1112 women in DECIDE and 155 women in STAND had CTX values ≥0.2 and P1NP values ≥25.8 ng/mL. The predefined target values were almost universally achieved at 3 and 9 mos on DMAb. After 3 months of DMAb, the CTX target was achieved in 95.1% of treatment-naïve and 97.1% of pre-treated PMO patients, whereas on ALN the CTX target was only achieved in 49.1% and 19.0% of treatment-naïve and ALN-pretreated PMO, respectively. Similarly, after 3 months of DMAb the PINP target was achieved in 98.0% of treatment-naïve and 98.5% of pre-treated PMO patients compared to 65.6% and 41.0% of treatment-naïve and ALN-pretreated patients (all $p<0.0001$ vs. DMAb).
Conclusion: In this population-based analysis, BTMs have utility in determining response, and awareness of failure to reach a treatment target may improve clinical management.

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Ten Years of Denosumab Treatment in Postmenopausal Women With Osteoporosis: Results from the FREEDOM Extension Trial

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Objectives: Osteoporosis is an important chronic disease, requiring prolonged treatment. Long-term efficacy and safety data are therefore of great importance. Denosumab (DMAb) is used in over 80 countries or administrative districts worldwide for the treatment of postmenopausal women with osteoporosis. The effects of DMAb treatment for up to 10 years have been evaluated in the 3-year FREEDOM study and its 7-year extension. Here, we report results through the final year of the extension, representing up to 10 years of continued DMAb treatment.
Methods: During the extension, all subjects were to receive 60 mg DMAb every 6 months and calcium and vitamin D daily. In this analysis, the long-term group received 10 years of DMAb treatment (3 years in FREEDOM and 7 years in the extension), and the cross-over group received 7 years of DMAb treatment (3 years of placebo in FREEDOM and 7 years of DMAb in the extension).
Results: Of the 4,550 subjects who entered the extension, 2,784 (61%) continued to participate at the beginning of year 10. Of these, 2,212 (80%) have completed their final 10-year visit, 120

(4%) discontinued, and 452 (16%) were ongoing at the time of this submission. In the long-term group, further significant increases in BMD occurred with mean cumulative 10-year gains from FREEDOM baseline of 21.6% (lumbar spine) and 9.1% (total hip). The cross-over group had mean cumulative 7-year gains of 16.3% (lumbar spine) and 7.3% (total hip) from the extension baseline (all $P < 0.0001$ compared with FREEDOM baseline, extension baseline, and previous measurement). Similar and sustained reductions in bone turnover markers were observed in both groups, with the characteristic attenuation of effect at the end of the dosing period. Yearly rates of new vertebral and nonvertebral fractures remained low. Overall incidence rates of adverse events (AEs) and serious AEs were consistent with data reported previously in the extension study.

Conclusion: DMAb treatment for up to 10 years was associated with persistent reduction of bone turnover, continued increases in BMD without therapeutic plateau, and low fracture incidence. The benefit/risk profile for DMAb in an aging population of postmenopausal women remains favorable.

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Hyperbaric Oxygen Therapy for the Treatment of Scleroderma Leg Ulcers – Case Report and Systematic Review of the Literature

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Objectives: Hyperbaric oxygen therapy (HBOT) has been used to treat chronic non-healing wounds since the 1960s. The mechanisms by which HBOT is thought to heal chronic ulcers include neo-angiogenesis, re-epithelialization, and vasoconstriction reducing edema in affected areas.

The role of HBOT in systemic sclerosis (SSc) associated ulcers, which are pathophysiologically different from other chronic ulcers and are often difficult to treat with current medical therapies, is largely unknown. We conducted a systematic review of the literature to identify cases of SSc associated ulcers treated with HBOT, and report a case of a patient with non-healing lower extremity ulcers who was successfully treated with HBOT.

Methods: Systematic review of the literature and case report of refractory ulcers in SSc treated with HBOT.

Results: In the systematic review of the literature, we found only eight individual SSc cases with refractory digital and extremity ulcers successfully treated with HBOT. Our patient is a 55 year-old man with limited cutaneous SSc since 2000, who developed chronic non-healing pretibial and peri-malleolar ulcers bilaterally. These gradually progressed and he was unable to ambulate despite the combination of various medical therapies (aspirin, pentoxifylline, isosorbide mononitrate, felodipine, tadalafil, antibiotics and analgesics), and intensive local wound care management. He was eventually referred for HBOT. The protocol for HBOT consisted of 30 total sessions in a monoplace chamber to a maximum depth of 2.4 atmospheres absolute (ATA) for 105 minutes per session. These were performed 5 days per week for 6 consecutive weeks. Three 5 minute breaks were implemented every 30 minutes to prevent oxygen toxicity. Adverse effects of HBOT are usually mild and reversible. They include ocular side effects (myopia, cataracts), barotraumatic injury (middle and inner ear, nasal sinuses, lung), pulmonary fibrosis, lower seizure thresholds, and anxiety. Unfortunately, our patient developed myopia at the 21st session and only completed 28 sessions. He had significant recovery of physical mobility and improvement of pain by the 9th session and almost complete healing of the ulcers by the end of treatment. He continued to show improvement in healing 3 months after

HBOT ended and his myopia had almost completely resolved by that time. Maintenance HBOT up to three times per year is available but has not been considered necessary yet.
Conclusion: This data provides evidence of a beneficial role of HBOT in SSc. A randomized controlled trial would be needed to confirm the efficacy of HBOT for healing refractory ulcers in SSc.

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Temporomandibular Pain in Patients with Juvenile Idiopathic Arthritis.

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Objectives: Joint pain is a primary symptom in Juvenile Idiopathic Arthritis (JIA). Experience of pain has been shown to be a significant predictor of impaired physical and psychosocial function. Although pain in JIA overall is a well-known feature and pain-related beliefs were significantly associated with pain in children with JIA, perception and impact of pain of the temporomandibular joint (TMJ) in patients with JIA is not well researched. Therefore a TMJ specific pain questionnaire was developed by the Clinical Recommendation group of euroTMjoint, an international network established in 2010 to enhance multidisciplinary, multicenter TMJ research in JIA. The aim of this study is to report the frequency and pattern of pain in the TMJ area and describe the impact on TMJ function.
Methods: A specific TMJ pain questionnaire was developed based on a Delphi study and systematic review. The following items were incorporated: pain frequency; pain intensity; pain location; TMJ function; TMJ symptoms; changes in facial or TMJ pain since last visit; changes in TMJ function since last visit. All consecutive JIA patients visiting one orthodontic clinic in Aarhus, Denmark, were included.
Results: 180 patients were approached to participate in the study. All patients agreed, however 8 did not complete the questionnaire, and were therefore excluded. 172 questionnaires were included. 58% (100/172) of patients reported the presence of TMJ pain with a median VAS of 3.6 (range 0.4-8.9). Imaging of the TMJ (CBCT or MRI) was available in 112 of the 172 patients (65%); 69% in patients with TMJ pain and 60% in patients without TMJ pain. Evidence of TMJ involvement on imaging was present in 61/69 (88%) of patients with TMJ pain and in 34/43 (79%) of patients without TMJ pain. The most frequent orofacial pain location was the masseter area followed by the TMJ region (58% and 46% respectively); and in both the masseter and TMJ regions in 15% of patients. Patients with TMJ pain reported significantly more functional problems, such as difficulty chewing, than those without pain. (70% compared to 7%, $p<0.0001$).
Conclusion: More than half of JIA patients experience orofacial pain. Most frequently this involves the masseter and TMJ region. TMJ pain seems to be more frequent in patients with TMJ pathology on imaging, however is also present when imaging is normal. Pain in the TMJ area is significantly correlated with functional TMJ problems.

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Baseline Autoantibodies Preferentially Impact Abatacept Efficacy in Patients with RA who are Biologic Naïve: 6-Month Results from a Real-World, International, Prospective Study

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Objectives: In a recent meta-analysis, neither rheumatoid factor (RF) nor anti-cyclic citrullinated peptide (anti-CCP) antibody status were associated with clinical response to treatment with anti-TNF agents.1 In contrast, anti-CCP positivity may be associated with increased abatacept efficacy in patients (pts) with prior biologic failure,2 and in biologic-naïve pts.3 In this analysis, the efficacy of abatacept after 6 months' follow-up in biologic-naïve pts enrolled in the ACTION study was compared in RF/anti-CCP positive versus -negative pts.
Methods: ACTION is a 2-year, international, multicenter, prospective, observational study evaluating retention and effectiveness of IV abatacept in pts with RA. Baseline characteristics and clinical outcomes were evaluated at 6 months and compared for anti-CCP/RF-positive and -negative pts who were biologic naïve using analysis of variance on ranks for quantitative variables and Fisher exact tests for qualitative variables. EULAR response was based on DAS28 (ESR or CRP) and derived from individual core components, as were mean CDAI and Boolean remission.
Results: In 672 biologic-naïve pts, RF status was reported in 577 (86%) pts (412 [71%] positive) and anti-CCP antibody status in 552 (82%) pts (3 [66%] positive); 308/511 (60%) pts were double positive and 127/511 (25%) pts were double negative. Clinical outcomes at 6 months were more beneficial for pts who were RF (p=0.012) or anti-CCP (p=0.015) positive versus negative, including EULAR good or moderate response versus no response; mean (95% CI) CDAI (calculated) (RF: 10.8 [9.8, 11.8] vs 15.3 [13.4, 17.2]; p<0.001; anti-CCP: 10.9 [9.8, 12.0] vs 14.3 [12.4, 16.2]; p=0.002) and Boolean remission (RF: 13.3% vs 4.0%; p=0.008; anti-CCP: 12.5% vs 6.3%; p=0.096). Similarly, significant differences in clinical outcomes were observed for pts who were RF/anti-CCP single positive or double positive versus double negative, (p=0.011 and p=0.008 respectively), including EULAR good or moderate response versus no response; mean (95% CI) CDAI (calculated) (11.1 [10.2, 12.1] and 10.5 [9.3, 11.6] vs 14.5 [12.3, 16.7]; p=0.003 and p=0.001, respectively) and Boolean remission (12.3% and 13.8% vs 3.8%; p=0.025 and p=0.013, respectively).
Conclusion: These are the first prospective real-world data showing superior efficacy of abatacept in biologic-naïve pts who are RF and/or anti-CCP positive versus negative, even when using stringent remission criteria. The association between autoantibody status and clinical outcomes with abatacept may be linked to the mechanism of action. 1. Lv Q, et al. PLoS One 2014;9:e89442. 2. Gottenberg JE, et al. Ann Rheum Dis 2012;71:1815–9. 3. Fujii T, et al. Arthritis Rheum 2013;65(Suppl.10):465.

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Novel Biomarkers Identified by Quantitative Mass Spectrometry Differentiate Patients with Psoriatic Arthritis (PsA) from Patients with Psoriasis without PsA

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Objectives: There is a high prevalence of undiagnosed PsA in psoriasis patients. PsA screening questionnaires have not been found to have good ability in identifying patients with PsA amongst

those with psoriasis. Soluble biomarkers for PsA may help in screening psoriasis patients for appropriate referral to a rheumatologist. We have previously identified 12 candidate markers (MPO, M2BP, DEFA1, H4, H2AFX, ORM1, CD5L, PFN1, C4BP, MMP3, S100A9, CRP) for PsA by quantitative MS based proteomic analysis of synovial fluid. We have also identified 8 novel markers (SRP14, ITGB5, POSTN, SRPX, FHL1, PPP2R4, CPN2, GPS1) by similar analysis of skin biopsies. Our purpose was to investigate whether serum levels of novel markers discovered differentiate PsA patients from those with PsC.
Methods: Serum samples were obtained from 100 patients with PsA, 100 with psoriasis without PsA (PsC), and 100 healthy controls. Subjects were group matched for age and sex. No patient was undergoing treatment with biologics at the time of serum collection. Using enzyme-linked immunosorbent assays, four high-priority markers, previously discovered by quantitative MS of synovial fluid and skin biopsies, were analyzed in the serum: Mac-2-binding protein (M2BP), CD5-like protein (CD5L), Myeloperoxidase (MPO), and Integrin-β 5 (ITGB5), as well as previously established markers Matrix metalloproteinase-3 (MMP3) and C-reactive protein (CRP). Data were analyzed using logistic regression, and receiver operating characteristic (ROC) curves were plotted.
Results: The 100 PsA patients (41 females, mean age 51 years) had mean psoriasis duration of 22.9 years, PsA duration of 14.6 years, swollen joint count 3.2, tender joint count 6, and PASI score of 4.7. The 100 PsC patients (45 females, mean age 50 years) had mean psoriasis duration of 20.3 years and PASI score of 4. The 100 controls (52 females) had a mean age of 35 years. Polychotomous logistic regression showed that ITGB5, CRP and M2BP are markers that are significantly different between the three groups. The analyses also showed that CD5L, ITGB5, M2BP, MPO, MMP3 and CRP are independently associated with PsA, while CD5L, M2BP and MPO are independently associated with PsC. When comparing PsA to PsC, ITGB5, M2BP, and CRP were found to be independently associated with PsA. ROC analysis showed an area under the ROC curve of 0.85 (95% CI [0.80, 0.90]).
Conclusion: CD5L, ITGB5, M2BP, MPO, MMP3 and CRP are soluble PsA markers. ITGB5, M2BP and CRP, are markers that may differentiate PsA from PsC. These markers require further validation.

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Using Serum-based Soluble Markers to Differentiate Psoriatic Arthritis from Osteoarthritis

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Objectives: It is often difficult to differentiate psoriatic arthritis (PsA) from osteoarthritis (OA) in clinical practice. Therefore, to aid clinical diagnosis, we aimed to identify soluble biomarkers that differentiate PsA from OA.
Methods: Serum samples from 201 patients with OA (mean age 65 years, 43.3% males), 77 patients with PsA satisfying CASPAR criteria (mean age 45 years, 54.5 % males) and 76 healthy controls (mean age 37 years, 50% males) were obtained from the respective biobanks of the Arthritis Program, University Health Network, and the University of Toronto PsA Program. These samples were obtained at the time of joint replacement surgery (OA) or at the time of clinical assessment (PsA, healthy controls), and stored at 80°C until laboratory assays were conducted. Soluble markers of cartilage metabolism (COMP, hyaluronan), metabolic syndrome

(adiponectin, adipsin, resistin, HGF, insulin, leptin) and inflammation/immune response (CRP, IL-1b, -6, -8, TNF-α, MCP-1, NGF) were assayed in the samples using Luminex multiplex assay. The levels of these markers in serum samples from the 3 groups were compared using the Kruskal-Wallis test. Pair-wise comparisons were made with Wilcoxon rank sum test. Multivariate logistic regression analyses with backward elimination adjusted for age and sex were constructed using markers significant at a p value of 0.1 in univariate analyses to identify markers that differentiate PsA from OA. To determine discriminative ability receiver operating characteristic (ROC) curves were constructed based on multivariate models

Results: Univariate analyses revealed that the following markers were significantly different across the 3 group ($p<0.0.001$)- COMP, hyaluronan; resistin, HGF, insulin, leptin; CRP, IL -6, -8, TNF-α, MCP-1, NGF. When comparing PsA to OA the following markers were significantly different ($p<0.0.001$)- COMP, hyaluronan; resistin, HGF, insulin; CRP, IL-6, -8, TNF-α, MCP-1, NGF. Multivariate analysis demonstrated that COMP (OR 1.24, 95% CI 1.06, 1.46), resistin (OR 1.26, 95% CI 1.07, 1.48), MCP-1 (OR 1.10, 95% CI .07, 1.48) and NGF (OR <0.001, 95% CI <0.001, 0.25) are independently associated with PsA vs. OA. The area under the ROC curve for this model was 0.99. Internal cross-validation of the model consistently identified MCP-1 as a PsA marker.

Conclusion: A panel of 4 biomarkers may distinguish PsA from OA. Further validation of this panel is currently underway.

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Quadriceps Muscle Weakness and the Risk of Knee Cartilage Loss on MRI in a Population-Based Cohort with Knee Pain

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Objectives: The objective of the study was to determine whether baseline quadriceps weakness predicts cartilage loss on MRI after 3 years.

Methods: Subjects 40-79 years old with knee pain were recruited as a random population sample. A physician examiner assessed quadriceps strength by clinical exam. Subjects were then classified as having either normal strength (grade 2) or quadriceps weakness (grades 0 and 1). Radiographs were graded using Kellgren Lawrence (KL) 0-4 scale and radiographic osteoarthritis (ROA) was defined as KL≥2. MRI of the knees was obtained at baseline and at 3-year follow up. MRI cartilage was graded on a scale from 0 to 4 and bone marrow lesions (BML) from 0 to 3 by a blinded musculoskeletal radiologist. Progression of OA was defined as worsening of cartilage damage by ≥1 MRI grade in at least 2 joint surfaces or ≥2 MRI grades in 1 joint surface. Logistic regression analysis was performed to evaluate the association of quadriceps weakness with whole knee cartilage loss (primary outcome) and with compartment-specific cartilage loss in the medial and lateral tibiofemoral (TF) and patellofemoral (PF) compartments. Adjustments were included for age, sex, BMI, malalignment, baseline MRI and BML scores, and follow-up time.

Results: Of 255 subjects, 163 were seen at a mean follow-up of 3.3 years. At baseline, 24.1%

had no OA, 36.5% had pre-ROA (normal radiograph, abnormal MRI) and 39.4% had ROA. Mean (SD) age was 57.7 (10.1) years, BMI 26.1 (4.2), WOMAC pain score 19.6 (16.8) and 54% were female. Baseline quadriceps weakness was seen in 17.5% of females and 5.3% of males. Overall, weakness was a predictor of whole knee cartilage loss (OR 3.38, 95% CI 1.01-11.30). In females with quadriceps weakness, there was an increased risk of cartilage loss (OR 4.91, 95% CI 1.11-21.79), which was not seen in males (OR 0.63, 95% CI 0.04-10.09). In compartment-specific analyses, quadriceps weakness was associated with cartilage loss in the medial TF compartment (OR 7.12, 95% CI 1.39, 36.45), while no significant associations were seen in the lateral TF (OR 1.40, 95% CI 0.16-12.02) and PF compartments (OR 2.28, 95% CI 0.35-14.90).
Conclusion: In this population-based cohort with knee pain, quadriceps weakness at baseline assessed by clinical examination, predicted whole knee cartilage loss in females, not males and predicted cartilage loss in the medial TF compartment after 3 years. A simple clinical test can assist clinicians to predict the risk of progression of early and advanced knee OA.

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Six-Year Retention Rates with Abatacept vs TNF inhibitors in the Treatment of Rheumatoid Arthritis: Experience from the Real-world Rhumadata Clinical Database and Registry

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Objectives: The sustainability of any regimen is an important factor to consider when selecting therapy for chronic conditions, such as rheumatoid arthritis (RA). Recent reports suggest that patients (pts) treated with abatacept (ABA) might have better retention rates than those treated with anti-TNFs. We aim to further assess long term retention rates of ABA in comparison with anti-TNFs in the first and second lines of treatment in a real life setting using the Rhumadata database and clinical registry.
Methods: RA patients treated at the Institut de recherche en Rhumatologie de Montréal and the Centre d'Ostéoporose et de Rhumatologie de Québec with either ABA or an anti-TNF inhibitor, adalimumab (ADA), etanercept (ETA), or infliximab (INF) as first biologic (first cohort) or second biologic (second cohort) after January 1st 2007. Characteristics were compared using ANOVA with Bonferroni correction. Kaplan-Meier methods were used to compute the cumulative incidence of treatment discontinuation.
Results: The first cohort included 403 pts (62 ABA, 111 ADA, 195 ETA, and 35 INF) and the second cohort included 189 pts (76 ABA, 47 ADA, 47 ETA, and 19 INF). No clinically significant differences in baseline characteristics were noted between treatment groups. There were no significant differences in retention rates between ABA and anti-TNFs in the first cohort (LogRank p=0.1614). The estimated 6-years drug retention rates were 52.3% (SD=8.4%) for ABA, 37.8% (SD=4.9%) for ADA, 43.6% (SD=4.3%) for ETA and 45.6% (SD=8.8%) for INF. In the second cohort, in patient with RA having failed a first anti-TNF agent, retention rates with ABA were significantly higher compared to anti-TNFs (LogRank p=0.0002). For this cohort, the estimated 6-years drug retention rates were 41.2% (SD=7.4%) for ABA, 15.2% (SD=6.3%) for

ADA, 22.7% (SD=7.5%) for ETA and 33.1% (SD=13.1%) for INF, and this was observed regardless of RF or anti-CCP status or whether the biologics were used as monotherapy or in combination with DMARDs. Lack of efficacy (40.1% and 57.3% in the first and second cohort, respectively) and adverse effects (13.9% and 12.2% in the first and second cohort, respectively) were the most commonly cited reasons for treatment discontinuation.
Conclusion: As a first line biologic, in patient with RA, ABA has similar 6-year retention rates as anti-TNFs. As a second line biologic, in patient with RA, ABA has significantly higher 6-years retention rates compared to anti-TNFs. Patient and/or disease related factors that might have an impact on long-term retention should be further explored.

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Disease and Treatment Characteristics that Might Influence Long-term Retention with Biologics in the Real-world Clinical Setting: Experience from the Rhumadata Clinical Database and Registry

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Objectives: Patient adherence and sustainability of the regimen plays an important role in the long term outcomes. Biologic disease-modifying antirheumatic drugs (bDMARDs) have revolutionized the treatment of rheumatoid arthritis (RA), yet drug discontinuation is common. We aim to investigate factors that might influence long-term retention with biologics in a population-based of real-life unselected RA cohort.
Methods: RA patients (pts) treated with abatacept (ABA) or an anti-TNF inhibitor, adalimumab (ADA), etanercept (ETA), or infliximab (INF) were grouped according to their experience with biologics. Patient characteristics were compared using ANOVA with Bonferroni correction. Kaplan-Meier methods were used to compute the cumulative incidence of drug discontinuation.
Results: The first cohort included 403 pts receiving 1st line biologic (62 ABA, 111 ADA, 195 ETA, 35 INF) and the second cohort included 189 pts on their 2nd biologic (76 ABA, 47 ADA, 47 ETA, 19 INF). 11.9% of pts in the first (14.5% ABA, 8.1% ADA, 14.4% ETA, 5.7% INF) and 25.9% of pts (26.3% ABA, 27.7% ADA, 29.8% ETA, 10.5% INF) in the second cohort were on biologic monotherapy. Approximately 66% (66.7% first; 66.1% second cohort) of pts were rheumatoid factor (RF) positive. Anti-cyclic citrullinated peptide antibodies (anti-CCP) were detected in 62.0% and 55.4% of pts in the first and second cohort, respectively. Neither the RF status nor the use of biologics as monotherapy vs in combination with non-bDMARDs had a significant impact on long term retention. However, retention probability was significantly higher in the first cohort in anti-CCP positive vs negative patients (LogRank p=0.0387). The anti-CCP positivity did not affect retention in the second cohort. Although there were no significant differences in retention rates in the first cohort, in the second cohort treatment with ABA was associated with significantly higher retention compared to anti-TNFs (LogRank p=0.0038).
Conclusion: The anti-CCP positivity was associated with significantly higher retention when biologics were used first line. This is important as anti-CCP antibodies are predictors of an

aggressive disease.1 These results are compatible with other registries that indicate that anti-CCP might have an impact on retention rates.2 There were no significant differences in the retention rates in the first cohort between biologic therapies. In the second cohort treatment with ABA was associated with significantly higher retention compared to anti-TNFs. 1 Kastbom A, et al. Ann Rheum Dis. 2004; 63(9): 1085–9. 2Gottenberg JE, et al. Ann Rheum Dis. 2012;71(11):1815-9.

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Use of Rituximab Compared to Anti-TNF Agents as Second and Third Line Therapy in Patients with Rheumatoid Arthritis. A 6 Year Follow-Up Report from the Rhumadata® Clinical Database and Registry

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Objectives: The order of use of biologic agents after failing a TNF inhibitor is still a question for debate. Phase III trial data in TNF-IR patients show comparable efficacy results across biologic agents and limited head-to-head studies have been published. Prospective registries offer a unique opportunity to observe the effectiveness of these agents in a real-world clinical setting where all single diagnostic patient treated in the center are included. We report here a six-year follow-up analysis. Our aim is to evaluate if patients with rheumatoid arthritis (RA) treated with rituximab (RIT) after failing a first or a second anti-TNF agents (TNF-IR) have different six - year retention rate than patients similarly prescribed anti-TNF agents (pooled adalimumab, etanercept or infliximab) and compare the treatment strategies of using RIT as second or third biologic treatment.

Methods: Data from TNF-IR RA patients prescribed adalimumab (ADA), etanercept (ETA), infliximab (INF) or rituximab (RIT) as second or third biologic agents on or after January 1st, 2007 was extracted and subjects taking either ADA, ETA or INF were pooled to form the anti-TNF cohort. Baseline demographics included age, disease duration, HAQ-DI, fatigue and pain visual analog scale evaluations (VAS), TJC, SJC, DAS 28 ESR and CDAI. Six-year drug retention rates were estimated and compared using Kaplan-Meier survival estimates. Statistical analysis was performed using SAS version 9.3. RHUMADATA® is a software used in daily clinical practice at the IRM and CORQ. All patients with RA are included.

Results: The data from 231 RA patients were extracted, 155 and 76 having respectively failed a first and a second anti-TNF agent. No clinically significant differences in baseline variables were observed between treatment groups in second and third intention. The 6-year retention rates of second-line RIT and anti-TNF uses were 80.1% and 19.1% respectively (Log-rank $p < 0.0001$). After two failures, subsequent use of RIT and anti-TNF agents respectively demonstrated 6-year retention rates of 53.6% and 37.2% (Log-rank $p=0.0473$). Second versus third line use was numerically (80.1% vs 53.6%) and statistically superior (Log-rank $p=0.0029$).

Conclusion: As second and third line agent, in TNF-IR patients, RIT demonstrates a better 6-year retention rate than anti-TNF agents. Second line use demonstrated a statistically better retention rate than third line use. This suggests that using rituximab as a second agent after

failing a first anti-TNF agent is a better strategy than waiting to use it after two different anti-TNF failure.

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Six Years Tocilizumab Use in Patients with Rheumatoid Arthritis with One Previous Anti-TNF Agent Exposure: Comparison with Adalimumab and Etanercept from the Provincial Electronic Database and Registry Rhumadata®

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Objectives: Tocilizumab, an intravenous agent, is approved for rheumatoid arthritis (RA) treatment in Canada since April 30th, 2010. It was the sixth approved agent after adalimumab, etanercept, abatacept, infliximab and rituximab. It has been demonstrated effective in the treatment of RA either in monotherapy or combo therapy after non-biologic or biologic DMARDS. The goal of this analysis is to describe its six-year effectiveness in patients with RA failing a first anti-TNF agents and to compare it with adalimumab and etanercept in the same clinical situation.

Methods: All patients with RA having failed a first anti-TNF agents and subsequently exposed to tocilizumab after the 1st of January 2008 were extracted from the Rhumadata® database. Three cohorts were created according to the time of introduction of tocilizumab or the subsequent anti-TNF agents: One cohort of patients starting tocilizumab and 2 other cohorts starting either Adalimumab or Etanercept. Demographics and baseline characteristics including age, gender, disease duration, rheumatoid factor and anti-CCP antibodies, CRP and ESR, the number of previously failed treatments, DAS 28 ESR and CDAI, HAQ-DI were included for each cohort. Kaplan-Meyer and Cox proportional hazard models were used to generate and compare retention rate.

Results: The data from 128 patients prescribed either tocilizumab (44=34%), adalimumab (38=30%) or etanercept (46=36%) as a second biologic agent were extracted from the Rhumadata® registry and clinical database. Most subjects were female (77.3%) and the average age of cohort subjects was 54.4 (SD=13.2). 69.3% and 62.2% of patients were respectively RF+ or anti-CCP+. Mean CRP and ESR were respectively 14.8 (SD=21.5) mg/L and 28.6 (SD=24.2) mm/hr. No clinically significant differences at baseline were observed between groups. The six-year retention rates of tocilizumab, adalimumab, and etanercept as second-line biologic agents were respectively 54.6% (CI 35.9-70.0), 22.8% (CI 9.7-39.1), 21.9% (CI 8.9 -38.6) respectively. Kaplan-Meier overall survival analysis revealed significant differences in the drug retention rates (log rank p=0.0007). Multivariate analysis adjusting for patient characteristics yielded hazard ratios of 2.66 (1.10-6.44), 5.33 (2.30-12.38) when respectively comparing adalimumab and etanercept to tocilizumab.

Conclusion: In RA patient having failed their first anti-TNF agent, tocilizumab, an Il-6 inhibitor, is a more valuable alternative than cycling to a second anti-TNF agent. Similarly to previously presented analysis, in patients having failed a first anti-TNF agent, it seems that using

an agent with a different mode of action such as abatacept, rituximab or tocilizumab versus a second anti-TNF agent delivers better long-term retention.

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Increased Direct Healthcare Costs in Systemic Lupus Erythematosus Pregnancies

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Objectives: Although adverse obstetrical complications are more frequent in SLE women, no one has evaluated healthcare costs during SLE pregnancies. Thus, we aimed to evaluate if SLE pregnancies result in higher direct healthcare cost components (including physician services during pregnancy and neonatal period, and delivery-related costs) compared to pregnancies from the general population.

Methods: We used data from the "Offspring of SLE mothers Registry (OSLER)", including all women who had ≥1 hospitalization for delivery after SLE diagnosis, identified through Quebec's healthcare databases (1989-2009), which provide information on all physician services and hospitalizations in the province. OSLER also includes a randomly selected control group of women, matched ≥4:1 for age and year of delivery. We determined average physician costs for the SLE and non-SLE pregnancies, from first gestational week until birth, and the neonatal period (for both mother and child) from birth until postnatal gestational age of 44 weeks. We also estimated average hospitalization costs for the SLE and non-SLE deliveries (including inpatient physician costs). Costs were normalized to 2014 Canadian dollars. We performed multivariate random effect log-linear and linear regression analyses to establish whether costs during pregnancy and the neonatal period were associated with SLE status, adjusting for relevant covariates.

Results: We identified 509 women with SLE, who had 712 deliveries, and 5824 controls who had 8363 deliveries during the study period. SLE deliveries occurred at a lower mean gestational age compared to control deliveries, and birth weight was lower in SLE offspring as opposed to unexposed offspring. In addition, the maternal length of hospitalization for delivery was longer for SLE deliveries versus controls. Compared to control pregnancies, we observed substantially higher costs for both physician services and hospital stays for delivery, resulting in higher costs for SLE pregnancies [10 833$ vs 6 828$; difference 4 004$ (95% CI 3 300, 4 709)]. In multivariate analyses, SLE pregnancies had a 32% (95% CI 29, 36) increment in costs, or alternatively a 3 690$ (95% CI 2 814, 4 567) increase in costs, compared to control pregnancies.

Conclusion: Compared to pregnancies from the general population, SLE pregnancies are associated with substantially higher direct healthcare costs, including costs for physician services and hospitalization for delivery. Our study is the first to highlight the economic burden of SLE pregnancies, identifying an area of heavy healthcare use.

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A Retrospective Cohort of Aortitis Cases in Calgary Over 10 Years

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Objectives: Isolated aortitis represents a significant fraction of all aortitis cases. However, it is presently a poorly defined entity. No specific pathological or clinical criteria exist for its

classification or diagnosis, except for presence of aortic inflammation and absence of clinical features of another systemic condition. As no guidelines exist to direct the initial workup, treatment, and subsequent monitoring of these patients, great case-to-case variability is observed. We aimed to describe the demographics, current management, and outcomes of patients with isolated aortitis in Calgary, Alberta.
Methods: A retrospective chart view was performed of all cases of aortitis diagnosed on pathologic specimens of heart or aorta from patients admitted for cardiothoracic surgery over 10 years in Calgary, Alberta. Cases were categorized etiologically based on predefined criteria. 43 cases of aortitis were identified, 41 of which had sufficient information available to be included in this review.
Results: The majority of aortitis cases were classified as isolated (70.7%). Other groups included infectious (10%), GCA (9.8%), Takayasu (4.9%), Behcet's (2.4%), and RA associated (2.4%). Isolated aortitis was slightly more common in females (58.6%). Average patient age at time of diagnosis was 66.9 years. The majority of patients underwent repair of ascending aortic aneurysms, and almost half (48.3%) were asymptomatic at time of aneurysm diagnosis. The evaluation of isolated aortitis included baseline inflammatory markers (51.7%), an infectious work up (55.2%), and serological assessment for systemic autoimmune disease or vasculitis (20.7%). Two patients with isolated aortitis were treated with prednisone, while the remainder received no form of systemic immunosuppression. Twelve patients with isolated aortitis experienced post-operative complications, the most common being post-operative bleeding. The average duration of follow up of all patients was 3.73 years. In three patients, diagnosis of a systemic inflammatory process was delayed, occurring after their initial admission.
Conclusion: Isolated aortitis was the most common form of aortitis identified. The majority of patients appeared to have good outcomes regardless of whether or not they received immunosuppressive therapy. However, longer follow up is required to provide better insight into long-term outcomes. In addition, the initial evaluation and approach to follow up of these patients was highly variable, and the extent and type of investigations patients received was not consistent. There is need for a more systematic approach to the diagnosis, monitoring and treatment of this emerging condition.

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Update on Rituximab Induction in Relapsing Granulomatosis with Polyangiitis (GPA): Long-term Outcome 12 Years Post-treatment

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Background: Granulomatosis with polyangiitis (GPA) is a systemic, pauci-immune vasculitis characterized by granulomatous inflammation affecting small vessels. Rituximab has emerged as an effective agent for induction for both new diagnosis and disease relapse. Several factors associated with rituximab use remain unknown including the long-term duration of remission, requirement for repeat treatments, and optimal maintenance therapy.
Objectives: To describe the long-term outcome of the first patient with severe, relapsing GPA treated with rituximab induction at our centre 12 years ago.
Results: A previously healthy 52-year-old male presented in September 2002 with hemoptysis, hematuria, and paresthesias to his hands and feet. A positive c-ANCA (anti-PR3 positive) and elevated ESR led to a diagnosis of GPA. Nerve biopsy revealed motor and sensory axonal polyneuropathy consistent with vasculitis. He was initially treated with IV pulse corticosteroids. During treatment with steroids, his disease progressed further with a purpuric rash consistent

with leukocytoclastic vasculitis on biopsy. He also suffered a non-ST elevation myocardial infarction (coronary angiogram normal, suggesting small vessel disease).
In October 2002, he received IV cyclophosphamide complicated by neutropenia requiring granulocyte-colony stimulating factor. Soon after induction therapy he developed critical ischemia of the left foot. MRA of the aortoiliac femoral region was normal, suggestive of small vessel disease. This ultimately required a below knee amputation.
Over the next 2 years, the patient remained dependent on IV cyclophosphamide and pulse steroids. Attempts to switch to PO cyclophosphamide and methotrexate were unsuccessful and resulted in disease flaring. Due to concerns regarding his cumulative cyclophosphamide dose and complications of treatment (including steroid-induced diabetes mellitus), a request was made for off-label approval of rituximab for refractory disease.
The patient received 1 treatment of rituximab (2 weekly doses of 1000mg IV). He achieved remission after 4 months. Maintenance methotrexate (10 mg subcutaneous weekly) was initiated Steroids were tapered gradually and discontinued in 2013. He continues on maintenance methotrexate and has experienced no evidence of disease activity for over 12 years. To our knowledge, this is the longest reported uninterrupted remission of relapsing GPA after a single treatment with rituximab.
Conclusion: Rituximab is an effective agent for induction in the setting of severe, cyclophosphamide-refractory GPA. Some patients may be highly responsive to rituximab and achieve long-term remission without requiring further treatment with rituximab. Ongoing observation of patients involved in large-scale trials of rituximab in GPA will be necessary to determine the natural history of vasculitis post-rituximab.

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Aspirin Dose in Kawasaki Disease - How Much is Enough?

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Objectives: Kawasaki disease (KD), an acute vasculitis of childhood has potentially serious cardiac morbidity. Standard guidelines exist for management of KD; however, there is considerable practice variation in the initial dose of acetylsalicylic acid (ASA, aspirin). The objective of this retrospective study was to determine if the use of initial low dose ASA (3-5 mg/kg/day) in patients with KD in one Canadian tertiary care center (Centre 1) resulted in an increased incidence of IVIG resistance compared to patients treated in a second Canadian center (Center 2) where high dose ASA (80-100 mg/kg/day) was used. IVIG resistance is defined as fever for more than 24 hours after the end of first IVIG infusion or recurrence of fever attributed to KD by the treating physician. The frequency of coronary abnormalities was also calculated.
Methods: We reviewed clinical charts of patients with a diagnosis of KD from January 2009 to December 2014 at centre 1 and from January 2005 to December 2014 at centre 2. Patients were included if they fulfilled American Heart Association diagnostic criteria for classic KD or were believed to have incomplete KD, and received IVIG. Data extracted included demographic, clinical and laboratory data at presentation, as well as treatment details. Chi square test was used for univariate analysis.
Results: Respectively from centers 1 and 2, 123/152 and 128/178 patients met the inclusion criteria. Reasons for exclusion were final diagnosis not KD, IVIG not used, charts incomplete.

Overall, 86/123 (69.9%), and 88/128 (68.7 %) patients met criteria for classic KD, whereas 37/123 (30.1%) and 40/128 (31.2%) subjects had incomplete KD. A total of 27/123 (21.9%) were IVIG resistant at centre 1 and received a second IVIG dose, while 11/128 (8.6%) received a second dose at centre 2 (chi square= 8.7, p=0.003). A subacute echocardiogram (6-8 weeks from initial diagnosis) was available in 117/123 patients (95.1%) in centre 1 and 126/128 (98.4%) patients in centre 2, out of which 5/117 and 12/126 had any coronary abnormalities (p= 0.17) and 2/117 and 5/126 had coronary aneurysms (p= 0.50). IVIG sources in both centers were not significantly different.

Conclusion: Low dose aspirin in the initial management of KD in this retrospective study was associated with increased IVIG resistance, without a significant difference in the incidence of subacute coronary abnormalities. Further analysis to corroborate these findings by adjusting for confounders is in progress.

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Giant Cell Arteritis Presenting with Bilateral Vertebral Artery Stenosis - A Case Report and Review of the Literature

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Purpose: To present a case of undiagnosed giant cell arteritis (GCA) presenting with bilateral vertebral artery stenosis.

Methods: A case report as well as a review of the literature for bilateral vertebral artery stenosis as the first presentation of GCA.

Results: A 66 year old female with known longstanding rheumatoid arthritis presented with bilateral arm claudication over 1 month and new onset of headache, nausea, and vomiting. She had recently been found to have bilateral subclavian and vertebral artery stenosis on CT-angiogram thought to be due to large vessel vasculitis with an unclear etiology. She had been on oral prednisone prior to admission. As she presented with a new headache, had an ESR that had been >50 mm/h before initiation of prednisone, was over 50 years old, and had bilateral large vessel vasculitis the underlying diagnosis was pinpointed as GCA as per the rheumatology team. She proceeded to have multiple acute cerebellar and brainstem infarcts, progressive decrease in her level of consciousness, and no response to high dose steroids. The outcome was death. Bilateral vertebral artery occlusion/stenosis is a rare presentation of GCA and 34 cases were found on review of the literature, with only 29 cases with clearly defined final clinical outcomes of survival or death.18 out of the 29 cases (62%) did not survive, leaving only 9 (31%) survivors. All 29 cases used glucocorticoids for induction therapy, with 51% receiving intravenous pulse therapy. There did not seem to be a survival benefit with addition of immunosuppressive drugs such as cyclophosphamide and rituximab in this cohort, as of the 5 patients who received them, only 1 survived.

Conclusion: Clinicians should be aware of the rare presentations of giant cell arteritis such as bilateral vertebral artery stenosis.

Keywords: Giant cell arteritis, bilateral vertebral artery occlusion (BVAO), large vessel vasculitis, bilateral vertebral artery stenosis

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PAN versus MPA: A Case Dilemma

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Background: Diagnosis of vasculitis research patients has been based on the Chapel Hill Consensus Conference (CHCC) classification criteria. Polyarteritis nodosa (PAN) is characterized as necrotizing inflammation of the medium and small sized arteries initiated by immune complex deposition (1, 2), whereas microscopic polyangiitis (MPA) is characterized as a small vessel vasculitis (i.e. capillaries, venues, arterioles) with serological evidence of myeloperoxidase-antineutrophil cytoplasmic antibody (mpo-ANCA) (3). However, differentiating between these two entities can be difficult given the similar clinical and biochemical manifestations (3) and due to the overlapping and conflicting classification schemes including American College of Rheumatology (ACR) criteria, CHCC definitions and Lanham criteria (4).
Objective: The aim of this case study is to highlight the difficulty in distinguishing PAN and MPA.
Methods: Medline database was searched using keywords such as "polyarteritis nodosa", "PAN", "antineutrophil cytoplasmic antibody" and "ANCA".
Results: A 70 year old male presented with a three month history of dry cough, weight loss of 15 pounds, decreased appetite, fatigue and one month history of subjective fevers in the context of an elevated white blood cell count, normocytic anemia and thrombocytosis. Chest X-ray showed interstitial changes with CT chest suggestive of interstitial lung disease (ILD) and multiple bilateral pulmonary nodules. He subsequently developed a multi-territorial stroke; mononeuritis multiplex with left foot drop and an acute kidney injury. His immunological work up revealed a positive p-ANCA with MPO. Renal biopsy showed active tubulointerstitial nephritis and a small granuloma without glomerulonephritis. His renal glucoheptonate study showed multiple renal cysts. An abdominal angiogram showed multiple renal pseudo-aneurysms suggestive of vasculitis.
Conclusion: Diagnosis of this case was challenging given that the patient had features of both vasculitic entities including a positive MPO, acute kidney injury without glomerulonephritis, microaneurysms on angiogram as well as pulmonary involvement with ILD and pulmonary nodules. As our patient had a positive MPO with pulmonary involvement, his presentation was more likely secondary to MPA as opposed to PAN despite lack of glomerulonephritis. This is further supported by the literature showing the presence of micro-aneurysms at a rate of 10% in MPA patients (5) and low prevalence of PAN (6,7).

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High Level of Inflammation Predicts the Development of Diabetes Mellitus in Patients with Psoriatic Arthritis

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Objectives: To estimate trends in the prevalence of diabetes mellitus (DM) in patients with psoriatic arthritis (PsA) in comparison to the general population in Ontario, and to assess whether the levels of disease activity and inflammation over time predict the development of DM in these patients.
Methods: A cohort analysis was conducted in patients followed in a large PsA clinic from 1978 to 2013. The collected information included demographics, lifestyle habits, medical history and disease-related outcomes. DM was defined as the use of medications for DM or elevated blood glucose. The prevalence of DM in patients followed up in the cohort was compared with data obtained from the Canadian Community Health Survey (CCHS), a cross sectional examination

of health status conducted from 1995 to 2013 in Ontario. Age-standardized morbidity ratio (SMR) of DM was calculated for years with available CCHS data. For the assessment of risk factors for DM, patients with an existing diagnosis of the disease at clinic entry were excluded. The following time-weighted arithmetic mean (AM-) levels were assessed as predictors of incident DM: tender and swollen joint counts, number of dactylitic digits, psoriasis area and severity index (PASI) and erythrocyte sedimentation rate (ESR). Cox proportional hazard models stratified by age-group at clinic entry and controlled for sex, cumulative steroid dose, duration of PsA and body mass index were used to compute the multivariate relative risk (RR) for incident DM.

Results: A total of 1305 patients were included in the analysis. The standardized prevalence of DM in 2013 was 11.3% (95% Confidence Interval (CI) 8.9%, 13.7%) and the SMR compared to the general population in Ontario was 1.43 (95% CI 1.2, 1.7, p=0.002). An increase in the point-prevalence of DM over the past two decades was observed. Of the 1065 patients who were included in the time to event analysis, 73 patients developed incident DM. This cohort had a total of 11006 person-years of follow-up, with a mean of 10.3± 8.9 years per person. On multivariate analysis AM- tender joint count (RR 1.68, 95% CI 1.2-2.36, p=0.003) and AM-ESR (RR 1.21, 95% CI 1.04-1.41, p=0.01) predicted the development of DM.

Conclusion: The prevalence of DM is increased in patients with PsA compared to the general population with a gradual increase in the prevalence over the past decades. The risk of developing PsA is predicted by exposure to elevated levels of inflammation over time.

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Subclinical Ultrasonographic Enthesitis in Patients with Psoriasis is Associated with Risk Markers for Psoriatic Arthritis

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Objectives: Enthesitis is considered a primary feature of psoriatic arthritis (PsA). PsA has a period of pre-clinical disease in which enthesitis can be detected in patients with psoriasis only by sensitive imaging modalities. In this study we consider the presence of subclinical enthesitis on ultrasound as a proxy for PsA-risk. We aimed to estimate the prevalence of subclinical enthesitis in patients with psoriasis without clinical arthritis and to assess their relation with known risk markers for PsA.

Methods: 178 patients with a diagnosis of psoriasis confirmed by a dermatologist were enrolled. Patients with clinical signs suggestive of PsA were excluded. Information about demographics, co-morbid conditions and psoriasis phenotype was recorded. Musculoskeletal ultrasound assessment of 12 entheseal sites was performed according to a standard protocol. Enthesis thickness, structure, calcification/bone proliferation, erosion, bursa and power Doppler signal in the cortical bone profile, tendon and bursa were scored according to the MAdrid Sonographic Enthesitis Index (MASEI). A cut-off of ≥20 was used to define "subclinical enthesitis". The association between the presence of subclinical enthesitis and patients' characteristics was assessed using logistic regression analysis adjusting for age.

Results: A total of 19 of 178 patients (10.7%) were found to have subclinical enthesitis on ultrasound (MASEI≥20). The most frequently affected sites were the attachments of the distal patellar tendon (46.7%), Achilles tendon (44.1%) and plantar fascia (38%). 37 patients (20.8%) had one or more entheseal sites with positive power Doppler signal. Patients with subclinical

enthesitis were more likely to be older (p=0.002), obese (p=0.01), diabetic (p=0.005), have nail pitting (p=0.006) and work in physically demanding occupations (p=0.01). Moreover, patients with subclinical enthesitis were more likely to report morning stiffness (p=0.008); however, no association was found with other musculoskeletal symptoms or patient reported outcomes estimating the degree of pain, function, fatigue and quality of life. On multivariate analysis the presence of ultrasonographic enthesitis was associated with obesity (Odds Ratio (OR) 14.3, 95% Confidence Interval (CI) 1.7, 118, p=0.01), current smoking (OR 5.1, 95% CI 1.3, 19.4, p=0.02), physically-demanding occupation (OR 4.3, 95% CI 1.3, 13.8, p=0.01), diabetes mellitus (OR 5.5, 95% CI, 1.1, 28.1, p=0.04) and psoriatic nail pitting (OR 4.3, 95% CI 1.5, 11.9, p=0.006).
Conclusion: The presence of subclinical enthesitis is associated with known risk markers of PsA including: nail pitting, obesity and occupation-related mechanical stress. These findings reinforce the use of ultrasound for investigation of pre-clinical PsA in patients with psoriasis.

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A Systematic Review of Rheumatoid Arthritis Characteristics and Clinical Outcomes in Indigenous Populations of Canada, the United States, Australia and New Zealand

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Objectives: Indigenous populations of Canada, USA, Australia and New Zealand have higher arthritis prevalence and phenotypic differences are believed to exist. The objective of our systematic review was to summarize disease characteristics, disease activity and outcomes for Indigenous populations.
Methods: A systematic search (to June 2015) was performed in medical, nursing, and Indigenous health databases. Search terms for the four Indigenous populations were combined with search terms for arthritis conditions. Studies reporting disease characteristics or disease activity measures were included; this abstract summarizes results for Rheumatoid Arthritis (RA).
Results: Of 5,269 titles and abstracts and 503 full-text reviews, 31 RA studies were included. Indigenous patients were 9-14 years younger at disease onset. Between 30-46% had nodules and 15-27% had associated Sjogren's syndrome or sicca symptoms. Erosions were found in 36-100% of American and Canadian Indigenous populations. The proportion RF+ was 52-100% in American Indians (n=8 studies), 78-87% in Alaska Natives (n=2 studies), 89% in Canadian Aboriginals vs 74% of Caucasians, 50-94% in Canadian First Nations (n=7 studies), and 83% in Canadian Inuit (n=1 study). The frequency of ACPA+ was 55% in American Indians, and %-91% in Canadian First Nations (n=5 studies). ANA+ frequency was 27-94% in American Indians (n=6 studies), 28% in Alaska Natives, 57% in Canadian Aboriginals vs 21% in Caucasian controls, and 75-77% in Canadian First Nations (n=3 studies). Just 1 of 2 studies comparing DAS28 scores in Indigenous populations to Caucasian cohorts found higher scores in the Indigenous group at the start of biologic therapy. There were no significant differences between Indigenous and comparison cohorts in any study reporting tender or swollen joint counts, but one study reported slower rates of improvement in joint counts during biologic therapy, and one study reported a lower likelihood to achieve remission (20% vs 58%), in the Indigenous groups. In comparison studies, physical function, pain, patient global evaluation and fatigue were found to be worse in the Indigenous populations. In one study there were no differences in global or component-specific quality of life between American Indians and Caucasians, but in a Canadian study after 1 year of biologic treatment, quality of life and well-being indices were worse in the Indigenous patients after adjustment for covariates.
Conclusion: Our synthesis highlights knowledge gaps that exist and assumptions that have been

made with regards to the RA phenotype of Indigenous populations. Contemporary studies are required to more fully understand the consequences of RA in these populations.

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Patient Preferences in Decision Making for Treatment of Rheumatoid Arthritis: A Systematic Review

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Objectives: Patients with early Rheumatoid Arthritis (RA) have numerous treatment options that differ in their benefits, risks, dosing and monitoring requirements. An understanding of patients' preferences for these trade-offs is necessary when making patient-centered treatment recommendations and decisions. The objective of this study was to systematically identify and summarize studies that have assessed the preferences of patients with rheumatoid arthritis for DMARD treatment.

Methods: We included qualitative and quantitative studies that assessed the preferences of adults with RA for DMARDs or treatment considerations relevant to DMARD choices. Studies were identified through systematic literature searches of five electronic medical databases (Medline, CENTRAL, EMBASE, Psycinfo, and HealthStar). The search strategy included MeSH headings and keywords for rheumatoid arthritis (RA), qualitative or quantitative assessment of patient preferences of DMARD's. The search was restricted to English-language articles. All abstracts were reviewed independently by 2 of 3 reviewers. Themes across studies were summarized.

Results: In total, 6192 abstracts were screened prior to selected articles undergoing full-text review. The included studies varied in their methods, population, and the treatments considered, making it challenging to summarize across studies. However, several themes emerged. In the studies that quantified patients' preferences across different treatment considerations, patients tended to rate improvement in pain and quality of life as more important than treatment side effects. Rare but serious side effects were generally rated as more important that nuisance side-effects. Additional considerations that were important to patients included physician experience and knowledge to direct treatment options. Studies in patients with early RA (disease duration <2 years), suggested that patients with early RA may be more focused on treatment benefits and willing to accept the risk of side effects or more complex dosing regimes. In some studies, patients displayed decreased risk aversion with prior experience to adverse events.

Conclusion: Conclusions regarding the balance of risks and benefits of DMARD therapy are challenging given the variability in study methods and populations. On average, patients valued treatment efficacy in favor of pain and function improvement despite aggressive treatment regimes. Clinicians should be aware that treatment preferences vary by patient characteristics such as disease duration, prior history of adverse events and disease activity.

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Cardiovascular Comorbidity in SLE has a Large Care Gap

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Objectives: To determine current practices regarding cardiovascular risk assessment in systemic lupus erythematosus (SLE) amongst rheumatologists, nephrologists, general internists and subspecialty trainees.

Methods: A 36-item questionnaire assessing current preventative care strategies, risk assessment, and beliefs regarding SLE and cardiovascular disease was sent electronically to physicians in internal medicine, nephrology, and rheumatology and subspecialty trainees at

UWO (N=169). Questions were based on current guidelines from the Canadian Hypertension Education Program, Canadian Cardiovascular Society and Canadian Diabetes Association. Chi squared testing was performed to assess for statistical significance of results between specialties.
Results: 25 physicians and trainees responded, corresponding to a 14.8% response rate. Of these respondents, 88% believed that SLE is a major risk factor for cardiovascular disease, and 72% felt that SLE patients should undergo cardiac risk stratification that is similar to those with diabetes. Only 4% of respondents felt that family physicians are aware of this increased risk, however only 52% of respondents discuss CV risk routinely in their notes to family physicians, with significantly higher likelihood amongst rheumatologists compared to nephrologists (P=0.003), general internists (P=0.015) and internal medicine trainees (P=0.011). Rheumatologists were also significantly more likely to counsel their SLE patients with regards to CV risk when compared to general internists (P=0.015) and internal medicine trainees (P=0.02). However, rheumatologists were less likely to order lipid levels on SLE patients compared to nephrologists, even in the presence of additional risk factors (P=0.04). There were no other statistically significant differences in practice between the surveyed subspecialties. All respondents reported assessing blood pressure at every clinical encounter. Half of respondents recommended a target blood pressure of 140/90 while the other half recommended targeting a lower value. Three-quarters reported that they would be more aggressive with risk management if the patient had lupus renal disease, while 44% would be more aggressive if the patient had antiphospholipid antibodies.
Conclusion: While most recognized the importance of CVD risk in SLE, there was little consistency in terms of CV risk assessment and preventative measures both within and between subspecialties, indicating a care gap. Likely non-respondents were not different in their attitudes (as they may have less interest in SLE). Results also indicate a need for improved communication between family physicians and specialists as most respondents felt that general practitioners may not be aware of the elevated risk of CVD in SLE and yet only half mentioned this to GPs.

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Clinical and Radiographic Efficacy of Sarilumab Plus Methotrexate in Biologic-Experienced and Biologic-Naive Patients with Rheumatoid Arthritis in a Phase 3, Randomized, Double-blind, Placebo-Controlled Study

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Objectives: Sarilumab demonstrated efficacy and safety in patients with moderate-to-severe rheumatoid arthritis (RA) and inadequate response to methotrexate (MTX) in the randomized, double-blind, placebo-controlled, phase 3 part of the MOBILITY study (NCT01061736). Approximately 20% of patients were exposed to prior biologic disease-modifying antirheumatic drugs (bDMARDs); none had a prior nonresponse to a bDMARD. This post hoc analysis compared clinical and radiographic efficacy and safety of sarilumab vs placebo at 52 weeks in RA patients who were bDMARD experienced and bDMARD naive in MOBILITY.
Methods: Clinical and radiographic efficacy and safety of sarilumab + MTX were examined over 52 weeks in the intent-to-treat population, categorized according to prior bDMARD exposure, including a subset with prior anti–tumor necrosis factor (TNF) therapy.
Results: Compared with placebo + MTX, smaller increases in modified total Sharp score (mTSS), including erosion (ES) and joint space narrowing (JSN), were observed with sarilumab

(150 mg every 2 weeks [q2w] + MTX and 200 mg q2w + MTX) at week 52, irrespective of prior bDMARD use (including the prior anti-TNF therapy subgroup). A significantly greater percentage of patients receiving sarilumab + MTX had no radiographic progression at week 52 vs placebo. Cumulative probability distribution plots for ΔmTSS, ΔES, and ΔJSN (from baseline) indicated a greater probability of radiographic progression with placebo + MTX than sarilumab + MTX irrespective of prior bDMARD use. In both bDMARD-naive and bDMARD-experienced patients, each of the sarilumab doses + MTX resulted in statistically significant ACR20/50/70 responses vs placebo at week 24 (which were maintained at week 52) and CDAI and DAS28-CRP responses vs placebo at week 52. Similar results were observed for the prior anti-TNF therapy subgroup. In both subgroups, adverse events (AEs) occurred at a greater frequency in sarilumab-treated groups than placebo. The most common treatment-emergent AEs with sarilumab + MTX included infections, neutropenia, injection site reactions, and increased transaminases, irrespective of prior bDMARD experience.
Conclusion: These results suggest that in patients with active RA and inadequate response to MTX, irrespective of prior bDMARD experience, sarilumab improved signs and symptoms of RA and inhibited progression of structural damage. The frequency and type of AEs seen with sarilumab were similar in bDMARD-naive and bDMARD-experienced patients.

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Pharmacologic Management of Takayasu's Arteritis: A Systematic Review.

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Objectives: The mainstay of treatment for Takayasu's Arteritis (TAK) is glucocorticoids; however, a large proportion of this disease is glucocorticoid-resistant and relapse is common upon withdrawal of glucocorticoids. The purpose of this study is to review the evidence on other immunosuppressants and biologic therapies for the induction and maintenance treatment of TAK.
Methods: A systematic literature review was conducted using Embase, Medline, Cochrane databases and European League Against Rheumatism (EULAR) and American College of Rheumatology (ACR) annual meeting abstracts. Search terms for Takayasu's Arteritis, treatment, drug therapy, and all possible immunosuppressive and biological agents were used. Case reports and small case series (< 4 cases) were excluded. Two authors independently reviewed the articles and discrepancies were resolved by consensus.
Results: Of the 911 publications identified from the literature search, 40 publications met inclusion criteria. Studies included open-label prospective studies and retrospective studies. Study sample sizes ranged from 4 to 36, with mean age between 12 to 41 and the percentage female between 60-100%. Treatments studied included methotrexate (MTX), azathioprine (AZA), mycophenolate mofetil (MMF), leflunomide (LEF), cyclophosphamide (CYC), anti-TNF agents, rituximab (RTX), and tocilizumab (TCZ). Studies reported effectiveness with respect to reducing disease activity and inflammatory markers, halting angiographic progression, and/ or glucocorticoid-sparing effect. Inclusion criteria and outcome measures were too heterogeneous to be pooled for meta-analysis.
Conclusion: Observational studies suggest a role for immunosuppressants and biologics in TAK; however, conclusions cannot be made regarding their efficacy given the lack of controlled studies. There is a need for larger, better designed studies with uniform inclusion criteria, disease activity scoring systems, and outcome measures.

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Paraneoplastic Digital Gangrene: A Case Report and Review of the Literature

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Objective: To discuss a potentially new etiology of digital vasculitis culminating in digital gangrene.

Methods: A case of digital vasculitis with ischemia is reported in a 51-year-old woman as a paraneoplastic phenomenon secondary to metastatic endometrial cancer. The English medical literature via Medline database was reviewed for key words either: “digital vasculitis” or “digital ischemia" and “endometrial cancer” or “uterine cancer”.

Results: One other case has been reported (in the German literature) of digital ischemia as a paraneoplastic marker of metastatic endometrial carcinoma. Another case report of digital ischemia was reported in association with uterine cancer. However, in the case described the patient had co-existing uterine cancer and metastatic colon cancer.

Digital vasculitis and digital ischemia have been reported in the literature as a paraneoplastic process related to many different malignancies. The proposed mechanisms of digital ischemia include: induction of vasculitis by antibodies to tumor antigens, digital vasospasm caused by sympathetic hyperactivity and digital artery obstruction due to hypercoagulability and hyperviscosity.

Conclusion: We report the second case of digital vasculitis leading to digital ischemia as a paraneoplastic process in metastatic endometrial cancer.

Keywords: Digital vasculitis, digital ischemia, endometrial cancer, uterine cancer, paraneoplastic process

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No Sex Bias in the Escalation of Therapy in the Treatment of Early Inflammatory Arthritis

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Objectives: Several studies have shown that females with early inflammatory arthritis have higher disease activity and worse patient-reported outcomes. Despite this, there are no sex differences in erosions at five years. It is hypothesized that the current measurement tools for disease activity are biased against females. The Hospital Universitario La Princesa Index (HUPI) is a validated tool in early RA and corrects for sex bias by adjusting for both the tender joint count and ESR for males and females. The purpose of this study was to assess sex differences in disease activity as measured by the DAS28 and HUPI, and whether there are sex differences in escalation of therapy. A secondary objective was to validate the HUPI in a Canadian population.

Methods: Data from the Canadian Early Arthritis Cohort (CATCH) were used for a sex-stratified analysis of disease activity and treatment escalation at 3, 6, 12, 24 and 60- month follow-up. Patients were included if they met the ACR 1997 or 2010 classification criteria for RA and their sex was documented. For the analysis, patients were classified into remission, low

disease activity and moderate/high disease activity using the DAS28 and the HUPI cut points.
Results: 2228 patients (1619 females, 609 males) met the inclusion criteria. Females were younger (52 vs 58 years, p<0.001) and more frequently seropositive (72% vs %, p<0.001). Males had more erosions at baseline (14% vs 9%, p<0.004) and higher swollen joint count (9 vs 7, p<0.001). The DAS28 was similar in both groups at baseline (5.1 vs 5.0, p=0.6) with the HUPI score higher in males (8.9 vs 8.3, p<0.0001). More females were taking NSAIDs (60% vs 52%, p<0.001) and steroids (81% vs 59%, p<0.002) at enrolment into the cohort but these differences resolved by twelve months. The proportion of patients on DMARDs and biologic agents did not differ by sex at any time point. There were no sex differences in the escalation of therapy when patients were stratified by DAS28 or HUPI disease state. More males were in DAS28 remission at 60 months (67% vs 52%,p=0.01) but the same proportion were in HUPI remission (53% vs 50%). There were no sex differences in erosions at follow-up. The HUPI correlated well with the DAS28 (r=0.872, p<0.001).
Conclusion: There were no sex differences in treatment or escalation of therapy. The HUPI correlates well with the DAS28, can be used with ESR or CRP and is easy to calculate.

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Nurse-led Care for Patients with Rheumatoid Arthritis: A Systematic Review

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Objectives: Rheumatoid arthritis (RA) requires lifelong monitoring and treatment. Over the next decade, the number of patients with RA will grow, while the number of rheumatologists is expected to decline. Nurse-led care (NLC) has been introduced to address this shortage and has been evaluated in terms of patient satisfaction and disease measures but the impact on all dimensions of quality of care is unknown. We aimed to systematically assess NLC for RA patients in terms of its impact on multiple dimensions of quality compared to traditional models care.
Methods: Ovid MEDLINE, EMBASE, and CINAHL were searched from 1950 to January 2015. Studies were included if they met the following criteria: English language; original data from an original study; patients with RA, nurses took on primary responsibility for follow-up and/or management; reported data on one or more dimensions of quality as defined by the Alberta Health Quality Matrix (effectiveness, acceptability, efficiency, accessibility, appropriateness and safety). Quality of the studies was assessed using the National Institute for Health and Care Excellence checklists. Data were synthesized using the narrative analysis approach.
Results: 2017 potentially relevant citations were identified with 17 meeting inclusion criteria. These publications included ten randomized controlled trials, five qualitative studies and two economic evaluations representing ten unique studies, which were of moderate to high quality. The DAS28 was the most common measure of effectiveness with NLC being superior or equal to rheumatologist-led care (RLC) in three and two studies, respectively. Acceptability was assessed in six studies. Patients were more and equally satisfied with NLC as compared to RLC in five and one studies, respectively. With regard to efficiency, consults in NLC were longer and two studies reported 17-24% of visits required conferrals with rheumatologists. Three studies reported mixed data on cost of NLC with this model being equivalent or better than traditional models. Quantitative measures of accessibility were not found, although three qualitative studies reported patients found NLC provided improved continuity and accessibility of care. With regard to appropriateness, four studies detailed the opportunity of NLC for forming a therapeutic relationship and providing education and support. Two studies demonstrated NLC was safe, with

no difference in out-of-range blood tests and no significant changes in disease activity (DAS28 or HAQ).
Conclusion: NLC for RA patients is effective, acceptable, and safe. More information regarding accessibility, appropriateness and efficiency of this model, including its cost-effectiveness and the impact on patient flow through the system, is needed.

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No Escalation of Therapy Despite High Disease Activity in the CATCH Cohort

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Objectives: The standard of care for the treatment of rheumatoid arthritis (RA) is early aggressive therapy with a treat to target approach. Meeting this standard requires frequent follow-up and escalation of therapy. The purpose of this study was to look at the adherence to treat to target in the management of early arthritis in a Canadian population, by evaluating treatment escalation in relationship to disease activity state.
Methods: Data from the Canadian Early Arthritis Cohort (CATCH) were used for an analysis of disease activity and treatment escalation at 3, 6, 12, 24 and 60- month follow-up. Patients were included if they met the ACR 1997 or 2010 classification criteria for RA. For the analysis, patients were classified into remission, low disease activity, moderate disease activity (MDA) and high disease activity (HDA) using the DAS28 cut points. Treatment escalation was defined as any of: 1) increased dose of methotrexate; 2) addition of a new DMARD; 3) addition of a biologic agent; or 4) switching a biologic agent.
Results: 2256 patients met the inclusion criteria, with a mean age of 53 years (SD 15.3) and 73% female. Patients were predominantly seropositive (.8%) and at baseline 10% had erosions. The average DAS28 score at baseline was 5.1 (SD 1.4) with a HAQ of 0.92 (SD 0.7). At baseline 90% of patients were on a DMARD (49% in combination), 58% on an NSAID, 46% on a steroid and 2.4% on a biologic agent. Only 39% (n=204/519) of patients in MDA at three months had an escalation in therapy. Proportions for escalating therapy were even lower at 6 months (32% n=139/434), 12 months (23% n=82/363), 24 months (24% n=59/241) and 60 months (18% n=12/65). Escalation of therapy was higher in those patients with HDA: 61% (n=136/223) at 3 months, 44% (n=69/156) at 6 months, 33% (n=30/90) at 12 months, 41% (n=24/59) at 24 months and 6% (n=1/16) at 60 months. Of those patients with moderate or high disease activity at three months who did not have an escalation of therapy, only 44% (n=179/399) were on DMARD combination therapy. The percentage of erosions in the sample increased to 11% (n=130/1184) at 24 months and 13% (n=53/406) at 60 months.
Conclusion: The reason for lack of escalation of therapy despite ongoing moderate to high disease activity requires more investigation. These results could indicate an increased effort to apply a treat to target approach is warranted.

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Sleep Disturbance in Psoriatic Disease: Prevalence and Associated Factors

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Objectives: Psoriasis is a chronic inflammatory skin disease characterized by scaling, erythematous plaques. Up to 30% of psoriasis patients develop an inflammatory arthritis termed psoriatic arthritis (PsA). Psoriatic disease (PsD) patients report impaired sleep quality, but the relationship between sleep quality and disease and demographic factors has not been examined. This study aims to determine and compare the prevalence and quality of sleep disturbance in patients with PsA and patients with psoriasis without PsA (PsC), and to identify associated disease-related and demographic factors.
Methods: The study included 113 PsA (CASPAR criteria) and 62 PsC (evaluated by a rheumatologist to exclude PsA) patients (mean age 57.4±11.6 and 56.9±14.2 years, men 55% and 40%, disease duration 17.1±11.6 and 25.9±17.0 years, respectively), and 52 healthy controls (mean age 42.2±13.6, men 29%). Clinical variables were collected using a standard protocol. The sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI). Other patient reported outcomes collected included the Health Assessment Questionnaire (HAQ), Dermatology Quality Life Index (DLQI), EQ-5D, Medical Outcome Study Survey (SF-36), patient global assessment (PGA) and the Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT) Scale. Statistical analysis includes descriptive statistics, Wilcoxon rank-sum test and linear regression.
Results: The prevalence of poor sleep quality was 84% (95/113), 69% (43/62), 50% (26/52) in PsA, PsC and healthy controls, respectively. Total PSQI score was higher in both PsA and PsC patients compared to healthy controls (9.24 and 7.18 vs. 5.67, $p<0.01$) and higher in PsA patients compared to PsC patients (9.24 vs 7.18, $p<0.0001$). PSQI components of sleep disturbances, latency, daytime dysfunction, and subjective sleep quality contributed to worse sleep quality in PsA patients compared to PsC patients ($p<0.01$). Controlling for sex and group, anxiety, EQ-5D and FACIT were independently associated with worse PSQI in PsC and PsA patients ($p<0.05$). Controlling for age, sex, and BMI, actively inflamed (tender or swollen) joints are independently associated with worse PSQI in PsA patients ($p<0.01$).
Conclusion: Patients with PsD have poor sleep quality, especially in those with PsA. Poor sleep is associated with fatigue, anxiety, and lower EQ-5D in patients with PsD. In patients with PsA, poor sleep is associated with active joint inflammation. . However, given this was a cross-sectional study, whether anxiety and lower EQ-5D are the causes or the consequences of poor sleep remains to be determined.

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A Needs Assessment for New Models of Care for Pediatric Rheumatology in Ontario

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Objectives: Childhood arthritis affects 1-4/1000 Canadian children. The 25 pediatric rheumatologists in Ontario service a population of 14 million people, and patients residing in northwestern Ontario travel up to 1500 km for rheumatology care at a tertiary care centre. Telemedicine utilizing Advanced Clinician Practitioner in Arthritis Care (ACPAC) trained physio- and occupational therapists is an innovative way to provide care to patients in distant communities. Our objective was to conduct a needs assessment for new Models of Care (MOCs) for pediatric rheumatology in Ontario.

Methods: Patients and their caregivers traveling >25 km to the rheumatology clinic at SickKids received an anonymous survey to complete during their clinic visit. Quantitative data were summarized using descriptive statistics and qualitative data were analyzed by coding to identify themes.
Results: The survey was distributed to 134 families; 111 surveys (83%) were fully completed and returned. Eighty percent of respondents travelled >50 km to their appointment, while 11% travelled >200 km. Most families (88%) travelled >1 hour to their appointment; the most frequent transportation mode was driving (78%). Over two-thirds of families ranked the cost associated with the appointment as moderate to high. Eighty (72%) families spent $26-$50 on their appointment, while 8% of families spent >$100. Missed work was a concern, with 43% of caregivers requiring at least one full day off. Eighty-two percent were comfortable seeing an ACPAC in addition to their doctor, and 77% were unaware that telemedicine is a free service enabling interaction with their pediatric rheumatologist at a hospital in their community. Fifty-one percent indicated they would be comfortable communicating medical issues using telemedicine, while 33% were unsure. Considering the overall costs, 32% indicated that they would rather use telemedicine to avoid coming to clinic, while 31% were unsure. Several themes were raised including the importance of seeing the healthcare team in person for physical examination; hesitancy to use telemedicine due to lack of experience; and preference for an assessment closer to home. Parents indicated that jobs were in jeopardy due to missed time, and the high cost of parking was a frequently reported deterrent.
Conclusion: Pediatric rheumatology visits are expensive, requiring significant travel and missed work/school. Families are interested in pursuing alternative options including telemedicine to interact with their healthcare team. Current barriers to these new MOCs include a lack of awareness of the role of telemedicine and the ACPAC therapist and how these can be implemented to reduce time and expenses.

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Autoantibody Profiles in Patients from the Systemic Lupus International Collaborating Clinics (SLICC) Cohort with and without Malignancy

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Objectives: Patients with SLE have slightly increased rates of malignancy overall, particularly of non-Hodgkin's lymphoma and lung cancer. It is unclear whether immunosuppressants or SLE disease activity mediates this risk. It is possible that certain autoantibody profiles in SLE may be associated with malignancy. Sjogren's syndrome is known to be associated with lymphoproliferative malignancies, scleroderma with lung cancer, and polymyositis with multiple malignancies. We postulated that the autoantibodies associated with these conditions may be associated with an increased risk of malignancy in SLE. To determine if the frequency of anti-Ro52/TRIM21, anti-Ro60, anti-SSB, anti-Scl70 and anti-Jo1 differs between patients with and without malignancy in an SLE inception cohort.
Methods: Patients from 32 centres in 11 countries were enrolled in the Systemic Lupus International Collaborating Clinics (SLICC) inception cohort within 15 months of diagnosis.

Demographic and clinical data and sera were collected at enrolment. The sera were analyzed at a single site using addressable laser bead immunoassay (FIDIS Connective Profile-13, TheraDiag, Paris) for anti-Ro52/TRIM12, anti-Ro60, anti-SSB, anti-Scl70, and anti-Jo1. Malignancy over follow up was ascertained by the physician during the annual study visit and verified where possible by pathological reports. The differences (and 95% CIs) in autoantibody frequency at enrollment between those who developed malignancy (versus those who did not) were calculated.

Results: 1166 patients were included; 89% female, 55% Caucasian, mean age at diagnosis 34.6 years (SD 13.5), mean disease duration at enrollment 5.6 months (SD 4.2), and mean follow up 6.9 years (SD 3.8). 37 malignancies were identified in 36 patients – 7 breast, 6 lung, 4 prostate, 4 basal cell, 3 cervical, 3 papillary thyroid, 3 melanoma, 2 hematologic, 2 oropharyngeal, 1 rectal adenocarcinoma, 1 unspecified cutaneous carcinoma, and 1 clear cell renal cell carcinoma. The frequency of baseline anti-Ro52/TRIM12 for those who later developed malignancy (versus those who did not) was 24.1% vs 34.6% (difference -10.5%, 95% CI, -26.3%, 5.3%), for anti-Ro60 31.0% vs 45.1% (difference -14.1%, 95% CI -31.2%, 3.0%), for anti-SSB 3.5% vs 15.1% (difference -11.7%, 95% CI -18.6%, -4.7%), for anti-Scl70 3.5% vs 5.4% (difference -1.9%, 95% CI -8.7%, 4.9%), and for anti-Jo1 3.5% vs 2.7% (difference 0.7%, 95% CI -6.0%, 7.4%).

Conclusion: Despite SLE patients having a greater risk of hematological and lung malignancies, patients with the autoantibodies studied in this report were not more likely to develop malignancy. Future analyses will include Cox proportional hazard regression to account for follow-up time.

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A Modification of the Psoriatic Arthritis Disease Activity Score (mPASDAS) Using SF-12 as a Measure of Quality of Life

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Objectives: The Psoriatic Arthritis Disease Activity Score (PASDAS) is a newly developed composite disease activity measure that summarizes psoriatic arthritis (PsA) disease activity with a score ranging from 0-10. PASDAS captures articular and extra-articular manifestations of the disease and the impact of the disease on the patient via the following variables: swollen and tender joints, dactylitis, Leeds enthesitis index, C-reactive protein, Health Assessment Questionnaire, physician and patient global disease activity, and the physical component summary score (PCS) of the medical outcomes survey Short Form 36 (SF-36). A limitation of PASDAS is that the score depends on the patient completing the SF-36, which requires a significant time to complete. A shorter 12-question subset of SF-36, the SF-12, with the same range of values, agrees well with the SF-36 in many patient populations. The current objective is to measure the agreement between PASDAS calculated using the standard scoring formula and mPASDAS calculated by replacing the SF-36-PCS with SF-12-PCS in the scoring formula

Methods: 100 PsA patients attending the University of Toronto PsA clinic for follow-up visits were consecutively recruited in June and July 2015. All variables required to calculate PASDAS were collected and PASDAS was calculated for each patient. The 12 item responses for SF-12 were extracted from the SF-36 questionnaires. A mPASDAS score was subsequently calculated based on the PASDAS scoring formula where SF-36 –PCS is replaced by SF-12 - PCS. A Bland-Altman plot of the mean differences in scores calculated via PASDAS and mPASDAS measured

agreement between the two sets of scores.
Results: An analysis of 100 patients [53% male, mean (SD) age 57.3 (11.9) years, mean (SD) disease duration 16.9 (11.7) years] revealed that the mean (SD) PASDAS was 3.29 (1.39) and the mean (SD) mPASDAS was 3.24 (1.27). The Bland-Altman plot produced a mean difference (95%CI) between mPASDAS and PASDAS of -0.05 (-0.07, -0.03). The lower limit of agreement was (-0.24[95%CI -0.21, -0.28]) and the upper limit was 0.14[0.10, 0.17]). The validity of the limits of agreement was supported by a number of normality tests indicating normally distributed differences.
Conclusion: The Bland-Altman plot of mPASDAS and PASDAS shows strong agreement without clinically significant systematic bias in mPASDAS scores. In clinical settings, the mPASDAS may replace PASDAS in disease activity assessment given the strong agreement combined with significantly reduced patient questionnaire burden.

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Treating Psoriatic Arthritis (PsA) to Target: Defining Psoriatic Arthritis Disease Activity Score (PASDAS) that Reflects High, Moderate and Low Disease Activity as well as Minimal Disease Activity (MDA) in PsA

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Objectives: PASDAS is a composite disease activity measure for PsA (range 0–10) for which low, medium, and high disease activity cutoffs were recently proposed. A minimal disease activity (MDA) state was also recently defined as a target for treatment. We aimed to establish a cutoff value of PASDAS that defines MDA state, to validate previously defined PASDAS cutoffs for low and high disease activity (3.2 and 5.4), and to define our own PASDAS cutoffs reflecting disease activity.
Methods: Patients were prospectively recruited from the University of Toronto PsA clinic and evaluated using a standard protocol. For aim 1 the optimal cutoff of PASDAS best discriminating patients in MDA from those not in MDA was determined using ROC curve analysis. For aim 2 sensitivity and specificity of the previously defined PASDAS cutoffs for high and low disease activity was determined. For aim 3 patients were dichotomized based on decision to escalate treatment by treating physician (indicator of high disease activity). ROC curve analysis (90% specificity) estimated the PASDAS cutoff for high disease activity. Further, the median value of PASDAS for each group estimated PASDAS cutoffs for low and high disease. Lastly, ROC curves (90% specificity) estimated PASDAS cutoffs using patient's global assessment of disease activity (PGA) as an external standard (<10 low; ≥10 moderate <30; ≥30 high <60; ≥60 very high). The mean values obtained by the 3 methods defined final PASDAS cutoffs.
Results: 180 patients [54% male, mean age 56.8 years, disease duration 17.6 years, mean (SD) PASDAS 3.28 (1.29), 48.3% in MDA] were recruited. PASDAS score of <3.2 defined MDA (AUC- 0.96, Youden index- 0.80). The published PASDAS cutoffs showed the following sensitivities and specificities (%), respectively: low- 100, 56; high- 12, 99 (PGA as external criterion). Using treatment escalation to indicate high disease activity state, a PASDAS of 4.70 (AUC- 0.76) best discriminated patients in high disease activity from those not in this state. Median PASDAS of escalation and no-escalation groups were 4.17 and 2.86, respectively. When using PGA, PASDAS cutoffs for low and high disease were 2.08 (AUC- 0.95) and 4.14 (AUC-

0.93), respectively. The final PASDAS cutoffs (mean of 3 methods) for low and high disease activity cutoffs were 2.5 and 4.3, respectively.
Conclusion: A PASDAS score <3.2 reflects MDA. Previously defined PASDAS cutoff for low disease activity state has high sensitivity whereas that for high disease activity has high specificity. The cutoffs identified in our cohort were lower.

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The Association of Femoral Acetabular Impingement and Delayed Gadolinium Enhanced MRI of Cartilage (dGEMRIC): A Population-based Study

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Objectives: 1) To assess the association of FAI and dGEMRIC T1 relaxation value (RV) scores. 2) To evaluate whether subtypes of FAI (cam, pincer, mixed) are associated with region-specific dGEMRIC T1 RV scores.
Methods: Caucasian subjects were recruited from a population-based cohort with and without hip pain and underwent dGEMRIC on a 3T magnet. Total hip and regional T1 RV scores were determined by a trained reader (intra-rater reliability = 0.99). On plain radiograph, cam impingement was defined by an alpha angle of >55°, while pincer impingement was defined by a lateral center edge (LCE angle) >40° or a positive cross-over sign. Mixed impingement was defined by the presence of both cam and pincer impingement. T1 RV scores of all FAI types and controls were compared in the anterior-superior, central-superior, and posterior-inferior regions of the femoral head using linear regression analysis, adjusted for age, sex, and BMI. All results were weighed for the greater Vancouver total population according to age, gender, and pain status.
Results: Subjects (n=128) had mean (SE) age of 38.0(1.4), 51.4% were female, 28.0% had hip pain. FAI was present in 47.7% (7.8% mixed type, 15.6% cam type, 24.2% pincer type). Mean T1 RV score for the whole joint was 823.1 in the FAI group, and 814.6 in the non-FAI group (p=0.63). Compared to cam (p<0.0001), pincer (p=0.02), and no FAI (p=0.0004), mixed FAI had a significantly reduced T1 RV score in the anterior-superior region, while T1 RV scores were not significantly different in the cam (p=0.069) and pincer groups (p=0.541) compared to the no FAI group. Similar results were found in the central-superior region. There was no association of pincer FAI with posterior-inferior T1 RV score (p=0.26).
Conclusion: Significant associations of regional cartilage degeneration were found in subjects with mixed type FAI compared to those with non-FAI hips, and those with pure cam and pincer FAI. This suggests that progression to mixed type FAI leads to a synergistic decrease in cartilage glycosaminoglycan content compared to either cam or pincer FAI alone. This study provides further insight into the pathophysiology of FAI in a young population-based cohort with early disease.

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Guidelines for the Rational Use of Follow-up Cardiac Echocardiography to Screen for

Pulmonary Arterial Hypertension (PAH) in Systemic Sclerosis (SSc)

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Objectives: Clinical practice guidelines recommend screening of all systemic sclerosis (SSc) patients for pulmonary arterial hypertension (PAH) with yearly echocardiograms. However, this may not be cost effective due to its low sensitivity and specificity and the low incidence of PAH in SSc. The primary objective of this study was to develop a risk prediction score to identify SSc patients who do not need an annual echocardiogram after a baseline echocardiogram.

Methods: Data were extracted from the Canadian Scleroderma Research Group registry. PAH was defined as a resting mean pulmonary arterial pressure of ≥25 mmHg and a pulmonary capillary wedge pressure of ≤15 mmHg, confirmed by right heart catheterisation. Univariate analysis was used to identify clinical variables associated with incident PAH. Multivariate logistic regression was used to identify independent predictors among selected variables ($p<0.05$ in univariate analysis). Backward selection was performed to identify the most parsimonious model. The performance characteristics of the models were estimated using sensitivity, specificity, area under the receiver operating characteristics curve (AUC), and coefficient of determination (R2). The estimated probability of incident PAH for all subjects was calculated using parameters from the backward selection model. We identified a cutoff of the estimated probability of incident PAH below which no subject had PAH.

Results: This study included 1034 patients (87% female, mean (SD) age 57.5 (11.8) years and disease duration from first non-Raynaud's disease symptom 13.2 (9.2) years, 45% with diffuse cutaneous SSc, and 37 (3.6%) with incident PAH. Shortness of breath (SOB) and diffusing capacity for carbon monoxide (DLCO) were the only independent predictors of incident PAH in multivariate analysis. The sensitivity, specificity, AUC and R2 of the full model were 90.0%, 56.3%, 90.3% and 28.8%, respectively, and of the selection model 90.9%, 60.3%, 88.3% and 23.9%, respectively. All cases of PAH had an estimated probability of incident PAH >1.6%, calculated using parameters from the backward selection model. There were 56.6% of the subjects who had an estimated probability of PAH <1.6%, of which none had PAH.

Conclusion: A simple risk prediction score consisting of DLCO and SOB can identify subjects at risk of PAH in a general SSc population. More than 50% of SSc subjects are at very low risk of PAH and it would be reasonable to defer annual echocardiogram screening in this group, representing large savings in health expenditures. These findings represent the first evidence-based risk score for the rational use of echocardiograms in an unselected SSc cohort.

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First Year Canadian Experience with Subcutaneous Abatacept in Routine Practice for the Treatment of Patients with Rheumatoid Arthritis: Data from the Orencia Response Program (ORP) Network

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Objectives: The subcutaneous (SC) formulation of abatacept (ABA) has been available in Canada since January 2014. Here we report first year experience with SC ABA in Canadian RA

patients (pts). Canadian guidelines recommend the use of anti-TNFs or other mode of action biologics, including abatacept, after inadequate response to DMARD.1 Furthermore, the availability of an SC formulation of a biologic increases the treatment options available to pts, particularly those wishing to self-administer their therapy.
Methods: Canadian RA patients who accepted treatment with abatacept (Orencia®) were enrolled in the Orencia® Response Program (ORP) registry. RA pts treated with SC ABA in routine practice between Jan – Dec 2014, were included in this analysis. Durability of treatment with SC ABA was assessed using Kaplan-Meier survival analysis.
Results: As of December 2014, a total of 1152 pts received SC ABA. Out of these, 698 (61%) received SC ABA as the first or second line biologic therapy and 454 (39%) as third or fourth line. The median age of pts prescribed SC ABA was 60 years (range 16-89); 79.3% were females; and the median time since diagnosis for the entire cohort was 11 years. 72% of pts had severe and 23% had moderate disease. The majority of pts received their treatment at home (68%), followed by rheumatology (12%) or ORP clinic (7%). Only 12 (1%) of pts received the treatment at a doctor's office. 12-month persistence rates were similar in biologic naïve and non-naïve patients: 76.7% (SD=3.7%) for pts receiving SC ABA first line (biologic naïve) and 73.6% (SD=2.2%) for biologic experienced (non-naïve pts).
Conclusion: This data demonstrate that SC ABA can be used early in the course of the disease (first or second line biologic therapy) as well as in patients who fail several previous lines of biologics. Treatment with abatacept resulted in high 1-year persistency rates in both biologic naïve pts as well as those who failed one or more previous lines of biologic therapy. 1Bykerk VP, et al. J Rheumatol. 2012;39(8):1559-1582.

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Updated Report of Real-World Use of Subcutaneous Abatacept in Canadian RA Patients: The Abatacept Best Care (ABC) Treat-To-Target (T2T) Study

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Objectives: Prior randomized controlled trials have demonstrated the superiority of a treat-to-target (T2T) patient management approach compared to routine care (RC), in improving clinical and patient reported outcomes in RA. The aim of this analysis is to describe the baseline profile of the patients enrolled thus far in Abatacept Best Care (ABC), a T2T study on RA patients treated under Canadian routine clinical care with subcutaneous (SC) abatacept. Furthermore, given that previous studies have shown inherent patient differences based on prior experience of biologic treatment, disease parameters at Abatacept initiation are compared in biologic-naïve vs. -experienced patients.
Methods: ABC is a prospective, multicenter, observational, randomized two-cohort study aimed at assessing the usefulness of T2T in real-life and describing the adherence of Canadian physicians to the recommended T2T treatment guidelines. Participating physicians are randomized at a 1:1 ratio to the T2T group, which receives training and recommendations on the T2T approach, or the RC group.
Results: 134 patients (71.6% females) were included with a mean (SD) age of 59.7 (11.4) years and duration since RA diagnosis of 8.2 (10.1) years. Family history of RA was reported for 38.8% of patients while 60.5% and 45.6% were rheumatoid factor and anti-CCP positive,

respectively. Prior biologic use was reported for 58 (43.3%) of patients. Abatacept was used as combination therapy in 80.6% of patients (mean methotrexate dose: 21.1 mg/week) while a loading dose of intravenous abatacept was used in 29.9% of patients without differences between biologic naïve vs. experienced patients. Mean (SD) disease parameters at baseline were: pain = .5 (21.3) mm, patient global = 63.3 (20.1) mm, morning stiffness = 62.3 (21.7) mm, fatigue = 62.0 (23.6) mm, physician global = 61.6 (16.4) mm, ESR = 22.3 (19.6) mm/hr, CRP = 23.0 (37.7) mg/L, TJC28 = 10.2 (6.8), SJC28 = 8.7 (54.9), HAQ = 1.49 (0.60), RAPID3 = 18.2 (5.0), DAS28-CRP = 5.1 (1.1), CDAI = 31.4 (11.2), and SDAI = 33.9 (12.7). No significant differences were observed based on prior biologic experience.

Conclusion: This analysis presents the first glimpse at the real life use of SC abatacept in Canada. Approximately half of the patients enrolled in this real-life observational study initiated SC abatacept as first line. Abatacept was used as monotherapy in 20% of patients and a loading dose was used in 30% of patients. Further analysis will evaluate the impact of T2T on the real-life effectiveness of SC abatacept.

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Impact of Baseline Disease Activity, Disease Duration and Enrolment Year on CDAI and Boolean Remission in Patients with Rheumatoid Arthritis Treated with Anti-TNF-Alpha Therapy: An Analysis from a Prospective, Observational Registry

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Objectives: Early remission remains the main treatment goal in rheumatoid arthritis (RA) as high disease activity (HDA) is associated with an increased risk of morbidity and premature mortality. Identification of remission predictors may allow physicians to individualize patients' therapy in the management of RA. The objective of this analysis was to assess the impact of baseline disease activity, disease duration and enrolment period on CDAI and Boolean remission in RA patients initiating treatment with infliximab or golimumab in Canadian routine clinical care

Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, ankylosing spondylitis, or psoriatic arthritis with infliximab or golimumab. RA patients enrolled during 2002-2014 and with ≥1 follow-up assessment were included. Remission was defined according to the ACR/EULAR Boolean criteria (TJC28≤1, SJC28≤1, CRP≤1 mg/dL and PtGA≤1) or CDAI≤2.8. Associations between remission and baseline CDAI and SDAI disease activity states were described with the McNemar test. Associations between remission and disease duration (≤1 year, 1-5 years, >5 years) or enrolment period (2002-2004, 2005-2008, 2009-2014) were assessed with bivariate Chi-square analysis

Results: Among the 1206 RA patients included in the analysis, the majority were female (75.3%) and the mean (SD) age and disease duration were 56.1(13.5) and 8.4(8.9) years, respectively. The percentage of patients with baseline CDAI/SDAI HDA was 71.9%/67.1% while 21.8%/27.2%, 5.6%/4.8% and 0.7%/0.9% of patients had CDAI/SDAI baseline moderate disease activity (MDA), low disease activity (LDA) and remission, respectively. Overall, 32.2%,

29.5% and 38.3% of patients were enrolled during 2002-2004, 2005-2008 and 2009-2014 periods, respectively. Baseline disease activity was significantly associated with remission over time. After 6 months, 32.1%/33.3%, 14.9%/15.4% and 7.8%/6.1% of patients with CDAI/SDAI baseline remission/LDA, MDA and HDA achieved CDAI remission, respectively, while 35.1%/35.5%, 16.8%/16.8% and 9.8%/8.6% of the same respective populations achieved Boolean remission (all $p<0.001$). Following 12 months of therapy, 45.5%/48.4%, 17.3%/19.3% and 13.6%/13.5% as well as 51.7%/52.2%, 16.0%/17.9% and 13.8%/12.7% patients in the same respective populations achieved CDAI and Boolean remission (all $p<0.001$). Significantly more patients enrolled during 2009-2014 achieved CDAI and Boolean remission at month 12 than those enrolled in earlier years (2002-2004, 2005-2008, 2009-2014; CDAI remission: 10.1%,18.1%, 20.7%, $p=0.016$; Boolean remission: 7.6%, 16.8%,22.3%, $p=0.002$). Disease duration was not significantly associated with remission ($p>0.05$).

Conclusion: These results highlight the importance of early disease control and the prompt achievement of treatment targets and suggest that RA management has changed in recent years possibly reflecting changes in treatment recommendations.

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Increased Mortality Persons with Rheumatoid Arthritis is Partially Explained by Psychiatric Comorbidity: A Population Based Study

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Objectives: Rheumatoid Arthritis (RA) is associated with excess mortality. Indigenous North Americans (INA) have high RA prevalence rates and young age at onset yet experience disparities in arthritis treatment. We determined if comorbidity and mortality were increased in INA with RA and factors associated with mortality.

Methods: Using administrative health data (years 2000-2010; population 1.1 million), a validated definition for RA, and the INA identifier from Indian Affairs, we identified cohorts of incident (N=4195) and prevalent (N=8095) RA. Comorbidity was determined using a modified Charlson Comorbidity Index (mCCI) and the John Hopkins mental and physical Major Adjusted Disease Groups (mADG, pADG). Regional income quintiles estimated socioeconomic status. Death, age at death and cause were identified. Crude all-cause mortality rates were adjusted to age, sex and last visit mCCI. Annual mortality rates between INA and nonINA and persons with or without RA were compared using Student T tests. Cox proportional hazards models evaluated contributors to death in RA controlling for age, sex, ethnic group, income quintile, and comorbidity. Odds Ratio(OR) with 95% confidence limits (CL) are reported.

Results: In spite of a young onset age (INA 42 vs nonINA 55 yr $p<0.001$), INA were more likely to have nonRA comorbidity (mCCI >0) than nonINA at baseline (39% vs 31% OR 1.43 CL 1.25-1. $p<0.0001$) but not at last visit (both 22% OR 0.99 CL 0.84-1.16). More INA than nonINA reported mADG at baseline (27% vs 19% OR 1.59 CL 1.37-1.84) and last visit (26.9% vs 22.8% OR 1.29 CL 1.12-1.49). Between 2000-2010 1068 prevalent RA patients died (96 (9%) INA; 972 (14%) nonINA; 301 incident RA (23 (4%) INA; 278 (8%) nonINA). RA INA were younger at death than nonINA (56 (CL 54-59)vs 77 (CL 76-77) years; $p<0.0001$). Age and sex (and mCCI) adjusted mortality rates decreased in the general population yet increased for RA. Age, sex and mCCI adjusted annual mortality rates were higher in INA than nonINA with RA. Increasing comorbidity, both pADG (1. (1.29-2.08)) and mADG (1.56 (1.19-2.04)), older

age, female sex and lower income predicted death.
Conclusion: Persons with RA have increased mortality partly explained by increasing mental and physical comorbidity. The high rate of comorbidity at an early age and young age at death in INA RA is striking. The independent influence of mental comorbidity on mortality suggests complex social-biologic phenomena of relevance to INA given their unique social stressors must be addressed to improve outcomes for this vulnerable population.

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Developing a Shared Care Model for the Treatment of Albertans with Inflammatory Arthritis (IA)

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Objectives: Alberta's Bone and Joint Health Strategic Clinical Network (BJH SCN) is one of 12 networks established by Alberta Health Services to find new and innovative ways of delivering care that will provide better quality, better outcomes, and better value for every Alberta. The Arthritis Working Group (AWG) under the BJH SCN was tasked with critically assessing current care of patients with IA in Alberta and presenting suggestions to address deficiencies and improve patient care.
Methods: The AWG met over regular face to face and teleconference meetings in order to identify a continuum of care for patients with IA. Subsequently a strategic plan was developed to identify key challenges to delivering high quality health care to Albertans suffering from IA. Finally initiatives were planned to address priority pillars within the continuum.
Results: : The Arthritis Working Group developed a continuum of care with four distinct pillars: Identification, Early Diagnosis, Medical Management, and Shared Care. These pillars align with those developed by the Arthritis Alliance of Canada (AAC IA MOC) for care of IA. The strategic focus of the AWG is to address the following two challenges: (1) inadequate capacity for care along the continuum and (2) provincial disparity in clinical care and subsequent outcomes. The AWG was involved in the development of the Central Access research initiative to address pillar two. We then focused on the Shared Care pillar since the volume of established IA patients was perceived as a significant barrier to access to new patient assessments. We developed a roadmap for a shared care model which included (1) patient definition, (2) essential services and care provider skill set, and (3) a measurement framework for key performance indicators. The measurement framework includes system, clinic, and patient level outcomes
Conclusion: : The main tenets of the model are to ensure low disease activity in all patients with IA across the province in a setting which allows the rheumatologist to increase access to new patients. There are two sites in Alberta where this model is being evaluated. In Calgary the South Health Campus has been operating a shared care clinic for 12 months, with more than 200 patients being followed currently. In Edmonton, the ON-TRAAC program has been enrolling patients since September 2015.

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Adherence to a Treat-To-Target Strategy is Key to Attainment of Sustained Remission in Rheumatoid Arthritis: Data from the Real-world Practice BIODAM Cohort

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Objectives: Achievement of sustained remission is the most discriminatory factor that leads to prevention of structural damage in rheumatoid arthritis (RA) i n clinical trials of biological agents. We aimed to assess whether application of a treat-to-target strategy (T2T) in daily clinical practice is effective in attaining this stringent level of disease control that is necessary for optimal preservation of joint integrity.

Methods: Two-year data from BIODAM were used. BIODAM is a prospective cohort including RA patients in daily practice from 10 countries, who were started or changed on DMARD and/or anti-TNF treatment and were followed-up every 3 months. Participating physicians were required to practice treat-to-target per protocol. At each visit it was decided whether a patient was treated according to T2T-REM or not. The T2T-REM principle was considered met: i) if a patient had already a disease activity score below the target (DAS44≤2.4); or ii) if treatment was intensified (by increasing dosage or adding drugs) upon a DAS44>2.4. The main outcome for this analysis was attainment of sustained remission defined as DAS44<1.6 or ACR/EULAR Boolean remission for 3 consecutive visits over a 6 month period. Adherence to T2T-REM was analyzed using univariate and multivariate regression analysis to determine its association with sustained remission.

Results: 473 patients had at least 9 months follow up to allow assessment of 3 consecutive visits after baseline assessment (females 76.3%, mean age 57.8 years, mean symptom duration 6.3 years, mean baseline DAS 3.8, mean BL HAQ 1.1, 61.3% anti-CCP+, 63% RF+, 38.9% starting an anti-TNF agent at baseline). Sustained remission was attained by 152 (32.1%) and 58 (13.0%) of patients according to DAS<1.6 and ACR Boolean criteria, respectively. Adherence to the T2T strategy was recorded in a mean of 74.7% study visits per patient. In a logistic regression model that included age, gender, symptom duration, baseline scores for DAS/HAQ, treatment, anti-CCP, and adherence to T2T, the following were independently associated with DAS<1.6 sustained remission in multivariate analysis (Nagelkerke R2=0.56) as indicated by odds ratios (OR)[95%CI] and p values: gender (males) =2.13[1.10-4.11], p=0.025; baseline HAQ=0.49[0.30-0.80], p=0.0049; T2T adherence =1.13[1.10-1.17], p<0.0001.For the model with sustained ACR/EULAR Boolean remission as dependent variable (Nagelkerke R2=0.29) the following were significant: baseline HAQ=0.41[0.23-0.74], p=0.0029; T2T adherence=1.08[1.05-1.11], p<0.0001.

Conclusion: Only a minority of patients attain sustained remission in real world practice and the primary factors that influence this are adherence to a T2T strategy and baseline HAQ score.

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Factors Associated with Physical Therapy Use in Osteoarthritis of the Knee: Results from a Population-based Study

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Objectives: To identify factors associated with PT use in a population-based cohort with OA-associated knee pain.

Methods: 255 subjects were recruited as a random population sample (MoDEKO study) in Greater Vancouver, Canada. Inclusion criteria were: 1) age 40–79 years, 2) pain, aching, or discomfort in/around the knee on most days of the month at any time in the past, and 3) any pain, aching, or discomfort in/around the knee in the past 12 months. Exclusions were: 1)

inflammatory arthritis or fibromyalgia, 2) knee arthroplasty, 3) knee injury or surgery within the past 6 months, 4) referred pain from hips or back, and 5) inability to undergo MRI. PT use during the past 12 months (dependent variable) was ascertained by self-report. Independent variables included predisposing characteristics including age, sex, ethnicity, level of education (≤/> grade 12), and median household income using the 2006 Canadian Census data. Need characteristics included body mass index (BMI), self-reported knee swelling in the past 12 months, physician diagnosis of OA, radiographic severity (Kellgren–Lawrence grading (KL) ≥/<2), and pain severity on flat walking, as assessed by the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index. Univariable logistic regression analysis was performed. Variables with $p<0.20$ were included in a multivariable logistic model to assess the association with PT use.

Results: 12% of the subjects reported PT use. Mean age was 57, mean BMI 26.5, mean of median household income $61,560, and mean WOMAC pain 17. 56% were female, 76% Caucasian, 77% attended post-secondary education, 39% were diagnosed with OA by a physician, 38% had KL ≥2, 51% reported knee swelling. In multivariable logistic regression analysis, female gender (OR 3.19, 95% CI 1.29-7.89) and self-reported knee swelling (OR 3.51, 95% CI 1.42-8.68) were significantly associated with PT use, while household income (as a factor of $10,000, OR 1.15, 95% CI 0.97-1.37), physician diagnosis of OA (OR 1.19, 95% CI 0.53-2.71), WOMAC pain on flat walking (as a factor of 10, OR 1.11, 95% CI 0.93-1.32) were included in the multivariable model, but were not statistically significant.

Conclusion: In this population-based study of subjects with knee pain, women and those with self-reported knee swelling were three times more likely to be current PT users. Interestingly, pain severity, physician diagnosis of OA, and household income were not significantly associated with current PT usage. Further longitudinal research will be important to identify other factors affecting PT use to target individuals at risk of underuse.

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Systemic Sclerosis Severity as a Singular Metric: Using Item Response Theory on Medsger's Disease Severity Scales

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Objectives: To create a single global disease severity score that orders systemic sclerosis (SSc) patients along the spectrum of severity, for use as an eligibility criteria, outcome measure or covariate in clinical studies of SSc.

Methods: Data from the multi-centered Canadian Scleroderma Research Group cohort was extracted. Organ specific disease severity was measured using the nine Medsger Disease Severity Scales (DSS). Generalized Graded Unfolding Model (GGUM) was used to weight the individual organ scores and generate a single overall score. GGUM does not require the assumption of monotonicity, which postulates that as the value of the latent trait increases, the expected score on every item must also increase, underlying other approaches such as the raw total summed score (SumSc) and empirical Bayes estimates from the Generalized Partial Credit Model (GPCM). The three approaches were compared on the basis of their fit to the observed distribution of the nine DSS and their ability to predict 2-year survival.

Results: The study included 877 SSc subjects: 86.4% female, mean age (SD) 55.0 (12.1), mean disease duration 10.7 (9.4) and 37.2% with diffuse cutaneous SSc. Two-year mortality was

16.5%. The GGUM model showed better fit to the observed distribution of the nine DSS scores than the SumSc and GPCM (Rsquare=24% vs 20% and 21%, respectively). Although all models provided similar rankings of patients with mild disease severity across all organ scales, GGUM ordered moderate-to-severe patients differently than the SumSc and GPCM. To simplify presentation, we standardized the latent traits to have mean zero and variance 1 so that they can be interpreted as standard deviations from the population mean latent severity. In patients with end-stage heart or lung disease, the median standardized GGUM, SumSc and GPCM scores were 1.27, 0.35 and 0.72, respectively. The GGUM had better sensitivity, but worse specificity for two-year mortality (80% and 53%) than the SumSc (67% and 62%). The GPCM had worse sensitivity (75%) and specificity (51%). Overall, the GGUM had the highest area under the ROC (0.70) compared to the SumSc (0.65) and GPCM (0.66).

Conclusion: We developed a single summary score to measure disease severity in SSc using a model that does not rely on an assumption of monotonicity. This measure represents significant progress in a field in which measurement of disease status is known to be challenging. Validation in an independent dataset and assessment of sensitivity to change are still needed.

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Interferon Gone Wrong: A Case Report of a Child Presenting with Polyarthritis and Chilblains Due to a SAMHD1 Gene Mutation

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Objective: To report a case of Aicardi-Goutières Syndrome (AGS) with polyarthritis as a major manifestation. AGS is a rare genetic disorder that usually affects the brain, immune system, and skin. Individuals with AGS may present with failure to thrive, short stature, chilblain lesions, seizures, and a wide spectrum of neurocognitive delays. Musculoskeletal manifestations have rarely been reported with AGS. Method: Case review and study of interferon-stimulated gene expression pattern ex vivo with and without tofacitinib. A 17-year-old male initially presented to his physician at six months of age with cold-induced, painful, red lesions on his ears, hands, and feet, without any fevers. He was initially diagnosed with erythema multiforme and treated with topical steroids. His intermittent rash persisted over several years, and was eventually diagnosed as chilblain lesions after a skin biopsy showed dermatitis with perivascular lymphocytic infiltration. The acral rash was treated symptomatically with nifedipine, topical steroids, and fusidic acid. He was also noted to have short stature, mild cognitive delay, and subtle dysmorphic features. Initial investigations included a normal karyotype, ophthalmologic assessment, and brain MRI. By age nine, he developed arthritis in his hands and ankles, and was treated with naproxen and joint injections. His initial inflammatory workup was unremarkable, including negative autoantibodies. Treatment was switched to Methotrexate by age 12, and Etanercept was added at age 13 due to ongoing polyarthritis with a good clinical response. He developed scarring over some previous skin lesions as well as mild flexion contractures in his fingers, but had an otherwise normal examination with no focal neurologic abnormalities. At age 16, whole exome sequencing revealed a homozygous and likely pathogenic variant (c. 1411-

2A>G) in the SAMHD1 gene. This specific variant is a less commonly identified mutation associated with AGS. Previous studies have showed that patients with this mutation have increased interferon-stimulated gene expression in their peripheral blood mononuclear cells (PBMCs).
Result: Our patient demonstrated an interferon-stimulated gene expression pattern relative to controls that was significantly diminished following ex vivo treatment of the patient's PBMCs with Tofacitinib.
Conclusion: This case illustrates the fascinating link between interferonopathies and systemic inflammatory features. Although this patient did not have any severe neurologic features of AGS, he likely has a mild phenotype in the spectrum. Such cases represent another possible etiology for children with unexplained polyarthritis. Recognition of this syndrome is important in identifying potential therapeutic strategies of autoinflammatory disorders, particularly with interferon inhibition.

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Broad Exploration of the Pre-clinical Rheumatoid Arthritis (RA) Serum Proteome using Aptamer Based Technology

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Objectives: The pre-clinical stage of RA (PRA) features abnormalities in the serum proteome that may serve as a source of biomarkers for predicting disease onset and for understanding disease pathogenesis. Aptamers are nucleic acid based molecules that bind proteins specifically, and offers the ability to simultaneously quantify a large array of proteins in the same sample. Using aptamer based technologies; we mined the pre-clinical serum proteome of a small cohort of longitudinally followed individuals who ultimately developed clinically detectable RA.
Methods: We focused on ten first-degree relatives (FDR) of North American Native RA patients who developed synovitis after having been followed prospectively as part of a large cohort of FDR who are at risk for developing RA. Clinical and demographic data, along with autoantibody status, were available on these individuals at two time points, the more recent being at the time of synovitis onset. Serum samples available from these two time points were analyzed using the SOMAmer© (slow off-rate modified aptamers) platform (SOMALogic Inc., Boulder, Co) to generate simultaneous quantitative levels on 1132 serum proteins. Fold changes for each individual protein at the two time points was derived from the data. The significance of the fold changes was calculated by paired analysis using Stanford Analysis of Microarrays (SAM) software with a false discovery rate set at <1%.
Results: Of the 10 patients who converted from PRA to clinical RA, 6 were female, and all were active smokers. The average age at conversion was 34.8(+/-13.6) years, while the average number of months to conversion was 51.8(+/-30.6). Anti-CCP antibodies were detectable in the PRA stage in 4 patients, and in all 10 patients at the time of clinical disease onset. Quantification using the SOMAlogic platform followed by SAM analysis indicated that 18 proteins had a 3.2 (range=1.2-12.8) fold increase while 28 proteins had a 0.7 (range=0.3-.8) fold decrease in level. Pathway analysis of these proteins indicated a wide range of pathways and processes being involved, including angiogenesis, innate and mucosal immunity.
Conclusion: Based on a quantitative analysis of more than 1000 serum proteins, we have observed significant changes in the serum proteome of individuals when they develop clinically

detectable synovitis compared to a prior disease-free stage. Further work will include exploration and confirmation of identified proteins. Our approach demonstrates the utility of the approach for biomarker discovery, while providing a rich biomarker dataset with which to understand disease pathogenesis and potentially develop predictive algorithms.

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The Effect of Administration Route for Osteoporosis Therapy on the Fracture-to-Fall Ratio

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Objectives: Osteoporosis is a common condition associated with a risk of vertebral and non-vertebral fractures. Although evidence for effective pharmacotherapy supports the use of oral and parenteral bisphosphonates there have been few head-to-head trials. In treatment guidelines the choice of therapy is left to the prescriber. Experts recommend bisphosphonates as a first-line therapy because of established efficacy, excellent cost profile, and long-term safety data. However, it remains unclear whether patients who have been treated with oral bisphosphonates have increased benefit from subsequent treatment with zoledronic acid (intravenously) or denosumab (subcutaneously) from theoretical advantages. We hypothesized that osteoporotic individuals with prior fragility fractures whom have been treated with oral bisphosphonate therapy followed by parenteral therapy with either zoledronic acid or denosumab will show an improvement in bone mineral density (BMD) and a favourable fracture-to-fall ratio as compared to oral therapy alone.

Methods: We conducted a retrospective chart review from 2003 to 2014 of 50 osteoporosis patients (294 patient visits, average follow up 5.9 years) at a single Canadian osteoporosis center. Inclusion criteria were having had fragility fracture(s) while on oral bisphosphonate therapy with subsequent transition to parenteral treatment with zoledronic acid and/or denosumab.

Results: One hundred and twenty one falls and forty fractures were evaluated and we showed a fracture-to-fall ratio of 0.556+0.405 (95% confidence interval (CI)) in the oral medication arm and 0.195+0.157 (95% CI) in the pooled parenteral arm. Despite a favourable trend, no statistically significant difference in the clinical outcome was demonstrated (T=1.70, p=0.094).

Conclusion: There was improvement in absolute BMD at the lumbar spine and femoral neck for patients on zoledronic and denosumab vs. oral therapy in the preceding year (annual change in g/cm2: 0.0169 & 0.0017 for zoledronic acid at the lumbar spine and femoral neck, respectively, 0.0215 & 0.0096 for denosumab, 0.0060 & -0.00 for oral; ANOVA p=0.039 & 0.001 for oral vs zoledronic acid and oral vs denosumab comparisons) which is consistent with existing data in the literature supporting that parental therapy is superior to oral therapy in this regards.

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The Monetary Cost of Omega-3 Supplementation for Inflammatory Arthritis Patients: A Market Analysis

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Objectives: There is growing data that omega-3 supplementation may be of benefit in patients with rheumatoid arthritis. However, studies have used high doses of omega-3 (mean intake 3.7g of EPA + DHA) and did not consider the potential financial burden to the patient if this became standard of care. As omega-3 supplements are typically an over the counter natural health product (NHP), patients will not receive medication insurance reimbursement. Further, there are

numerous omega-3 supplement products available at a variety of price points. The aim of this study is to identify currently available omega-3 supplement products on the market and rank them based on reported quantity of omega-3 and unit price.
Methods: Potential stores where patients could purchase omega-3 supplements were selected. All available omega-3 products were identified and the following parameters were noted: natural product number (NPN), ingredients including amount of omega-3 (DHA+EPA) per dosage unit, number of servings, and price.
Results: A total of 140 products from 39 brands were identified at 11 pharmacies and health food stores, ranging in cost from $7.97 to $75.99 per bottle, and from 30 to 420 servings per bottle. Products were in pill, gummy and liquid form, and combined with a variety of additional NHPs, including vitamin D, coenzyme Q10, and omega-6 and 9 fatty acids. The average daily price for all products was $5.15 per 3.7g daily dose (range $0.49 - $54.24). The most cost effective fish oil omega-3 supplement identified was Equate Salmon and Fish Oils (NPN 80003624), available at Walmart with a unit cost of $0.49 per 3.7g of omega-3. A 30 day supply of this omega-3 supplementation has a total cost of $14.58.
Conclusion: There is a great deal of discrepancy in omega-3 products available for the arthritis consumer. It may be of value for rheumatologists to be aware of this information to provide their patients with the appropriate data when requested.

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Fibromyalgia Predicts Two-Year Changes in Functional Status in Rheumatoid Arthritis Patients

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Objectives: The prevalence of fibromyalgia (FM) is higher in rheumatoid arthritis (RA) patients than in the general population (10-20% vs 2-3%). Previous cross-sectional studies have shown that RA patients with FM have higher disease activity and worse quality of life compared to RA patients without FM. In this prospective study, we determined the impact of FM on 2-year changes in functional status of RA patients.
Methods: Subjects in a single center RA registry were enrolled in a 2-year prospective substudy examining characteristics of FM. Subjects completed semi-annual questionnaires and annual physical examination and laboratory tests. The primary outcome was change in the Multidimensional Health Assessment Questionnaire (MDHAQ) score over 2 years. The primary predictor was FM status, a dichotomous variable derived from the FM symptom scale ($\geq$13 indicating FM). Multivariable linear regression models were used to examine the association between FM status and change in MDHAQ score, adjusted for age, gender, race, baseline MDHAQ score, disease duration, RF/CCP seropositivity, disease activity and anxiety/depression. In secondary analyses, we examined the association between the baseline FM survey score, as a continuous variable, and change in MDHAQ score over 2 years.
Results: Of the 156 included RA subjects, 134 (85.9%) were female, and 145 (93.6%) were Caucasian. Mean age was 58.5 ± 11.0 years. Mean disease duration was 15.4 ± 9.2 years, and 111 (72.1%) were seropositive. Twenty-six patients (16.7%) had FM. Compared to RA patients

without FM, RA patients with FM had higher baseline MDHAQ scores (RA with FM: 0.74 ± 0.40, RA alone: 0.43 ± 0.39; P < 0.001) and Hospital Anxiety and Depression Scale scores (RA with FM: 13.65 ± 6.74, RA alone: 8.22 ± 5.75; P < 0.001). In a multivariable linear regression model, RA patients with FM had a 0.14 unit greater 2-year increase in MDHAQ score than RA patients without FM (P = 0.021). In secondary analyses, higher FM survey scores were associated with greater 2-year increases in MDHAQ score (β-coefficient 0.013; P = 0.011).
Conclusion: RA patients with FM experience significantly greater 2-year worsening of functional status compared to RA patients without FM. The change in MDHAQ score was 0.14 units higher over 2 years in the RA with FM group. This is equivalent to a difference of 0.15 units in the Health Assessment Questionnaire (HAQ). This difference is striking given that HAQ scores typically only increase 0.01-0.016 units per year in established RA patients.

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Clinical Manifestations and Disease Activity Comparison between Childhood-onset and Adult-onset Systemic Lupus Erythematosus (SLE) – The 1000 Canadian Faces of Lupus Cohort

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Objectives: SLE may manifest differently between childhood-onset SLE (cSLE) and adult-onset SLE (aSLE). We compared clinical presentation, disease activity and disease damage between cSLE and aSLE to determine if differences were due to time of disease onset (childhood-onset vs adult-onset) or ethnicity.

Methods: The 1000 Canadian Faces of Lupus Cohort is a multi-centre multi-ethnic prevalent cohort from 8 adult and 4 pediatric rheumatology Canadian centres. At each standardized visit, data on disease activity, co-morbidities, demographics, socioeconomic factors, laboratory values and treatment are collected. In this study, baseline data on demographics, ACR classification criteria, autoantibodies, disease activity, and damage accrual scores were compared between aSLE and cSLE; stratifying by ethnicity and disease duration. cSLE was defined by age of diagnosis less than 18 and included 217 cSLE followed in pediatric centres and 74 cSLE patients now followed in adult clinics. For variables with statistically significant differences between aSLE and cSLE (P-value<0.01), logistic regression was performed to determine if ethnicity or time of disease onset (childhood-onset vs adult-onset) accounted for the difference.

Results: Of 552 aSLE subjects, 502 (90.9%) were female. Mean age was 47.3 ± 13.8 years and disease duration 10.9 ± 9.6 years. In aSLE, there were 381 (69.0%) Caucasian, 43 (7.8%) Black, 43 (7.4%) Aboriginal, and 41 (7.8%) Asian patients. Of 276 cSLE subjects, 231 (83.7%) were female. Mean age was 18.3 ± 8.5 years and mean disease duration was 5.6± 8.2 years. In cSLE,

there were 101 (36.6%) Caucasian, 28 (10.1%) Black, 15 (5.4%) Aboriginal, and 111 (40.2%) Asian patients. The proportion of patients fulfilling ACR criteria did not differ significantly between aSLE and cSLE (P=0.4). aSLE patients had a higher proportion of discoid rash, photosensitivity, ulcers, arthritis and serositis. cSLE patients had a higher proportion of malar rash, neurological disorder, and hematologic disorder. Logistic regression suggested that the time of disease onset (cSLE vs aSLE) had a statistically significant effect on these clinical differences, when adjusted for disease duration. (P-value range: 0.005 to 0.069). Disease activity scores (SLEDAI and SLAM) and disease damage accrual score (SDI SLICC) were all higher in aSLE compared to cSLE, after adjusting for disease duration.
Conclusion: In our study, some clinical manifestations appeared to differ between adult-onset and pediatric-onset SLE. Disease activity and damage accrual scores appear to be higher in aSLE even after adjusting for disease duration.

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Ischemic Complications in Takayasu's Arteritis: A Meta-Analysis

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Objectives: Takayasu's arteritis (TAK) is a rare vasculitis affecting the large blood vessels. Significant morbidity and mortality results from ischemic complications of TAK. The objective of this meta-analysis is to determine the proportion of TAK patients with severe ischemic complications.
Methods: We performed a literature search using MEDLINE, EMBASE and the Cochrane library. Studies were included from database inception to January 2015. We included articles that reported at least one severe ischemic complication (stroke, myocardial infarction, ischemic ophthalmopathy leading to blindness, severe limb or end-organ ischemia requiring surgical intervention). We excluded non-English articles, case reports, case series or other studies that lacked systematic inclusion criteria of patients. Two authors independently reviewed the articles and discrepancies were resolved by consensus with a third author. Data on prevalence of severe ischemic complications and other clinical manifestations of TAK were extracted. A random effects model with inverse-variance weighting was used to estimate the pooled proportion of TAK subjects with ischemic complications.
Results: From the 1824 studies identified by the literature search, 450 articles were selected for full paper review. Of these, 35 studies met inclusion criteria, representing 3207 TAK patients. All studies were observational and of low to moderate quality. Median age at diagnosis ranged from 13 to 37 years and median delay from symptom onset to diagnosis ranged from 1 month to 5 years. Study follow-up times were from 30 months to 17 years. The proportion of females ranged from 53 to 100%. Geographic location/ ethnicity of cohorts varied widely with 15 Asian cohorts, 6 European cohorts, 5 Middle Eastern cohorts, 4 Hispanic cohorts, 4 North American cohorts and 1 South African cohort. Stroke and MI were the most consistently reported ischemic complications: 10.6% of TAK patients (95% CI: 8.7-12.5%) had a stroke and 4.9% of TAK patients (95% CI: 3.2-6.6%) had an MI. There is moderate heterogeneity across the studies (Stroke: I2=62.7%; MI: I2=82.7%), reflecting the diverse populations included in the studies.
Conclusion: Severe ischemic complications such as stroke and MI are common in TAK patients. Further studies are needed to identify predictors and preventative measure for severe ischemic events in TAK patients.

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Recurrent Benign Pneumatosis Intestinalis in a Patient with Systemic Sclerosis

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Case: A 62-year-old female, with known systemic sclerosis, presented with incidental findings of pneumatosis intestinalis, intra-abdominal free air and small bowel obstruction (SBO). She had a history of small intestinal bacterial overgrowth (SIBO) associated with her scleroderma, and complained of longstanding abdominal discomfort, diarrhea and nausea. Previously, her scleroderma had been managed with prednisone and hydroxychloroquine. She also had a history of esophageal dysmotility, Raynaud's, non-ischemic cardiomyopathy and COPD. On presentation, the patient was hemodynamically stable and afebrile, with a completely benign abdominal examination and no signs of peritonitis. Given her unremarkable exam and high level of risk associated with surgery, she was managed conservatively over 48 hours. Her abdominal pain and nausea improved. A repeat CT scan showed persistent pneumoperitoneum, however, the pneumatosis and obstruction had resolved. Given her medical comorbidities, she was deemed an unsuitable surgical candidate and was managed as an outpatient with close follow-up.
Her symptoms improved over two months, however, a follow-up CT scan showed increased intra-peritoneal air along with recurrence of the SBO and pneumatosis. General surgery and gastroenterology speculated her recurrent pneumatosis intestinalis was likely secondary to the scleroderma and its associated SIBO, though a definitive cause was yet to be found. She was started on antibiotics and will have follow-up CT scans. She will be managed medically unless her condition worsens to the point where it outweighs her surgical risks.
Discussion: Pneumatosis intestinalis, a collection of gas in the bowel wall, in the setting of connective tissue disease is rare. It has been previously described in the context of pneumatosis cystoides intestinalis (PCI), however, there have been only six prior published reports of spontaneous pneumoperitoneum in the absence of PCI, as seen in our case. Although its exact etiology is unknown, pneumatosis intestinalis in scleroderma may be due to minute perforations in the intestine. CT is the diagnostic modality of choice, however, it cannot distinguish between benign and life-threatening disease. History and clinical examination are especially important in the diagnosis of benign pneumatosis intestinalis to avoid unnecessary interventions.
Conservative medical therapy is the mainstay of treatment. A recent study showed that abdominal distention, peritonitis and lactic acidosis were predictive of positive intraoperative findings. Surgical intervention is indicated in such cases that suggest intestinal perforation. Antibiotics, prokinetics and parenteral nutrition can provide symptomatic relief in acute disease, but no formal therapy has been established for benign pneumatosis intestinalis in the context of CTD.

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A Comparison of Pediatric vs Adult Subglottic Stenosis in ANCA-associated Vasculitis

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Objectives: Subglottic stenosis (SGS) is a known manifestation of anti-neutrophilic antibody-associated vasculitis (AAV). Subglottic stenosis is a more common manifestation of AAV in children (41-48%) than adults (10-23%). Literature comparing SGS in pediatric and adult-onset disease is sparse with limited details regarding the differences in management and outcomes between these two groups. We compared the presentation, management and outcomes of three cases each of adult versus pediatric-onset SGS in AAV.
Methods: A retrospective chart review of patients with known AAV and SGS was completed.
Results: Two adult patients were female and one was male; all pediatrics patients were female.

The age of diagnoses was 17, 46 and 44 for adults and 10, 13 and 16 for children. Follow-up periods in the adults were 7, 18, and 136 months and 6, 22 and 67 months in the children. Subglottic stenosis was part of the initial presentation in two adult cases while all three pediatric cases presented with SGS at the time of diagnosis. All three adults had disease involvement of multiple organ systems while pediatric cases presented with milder disease with SGS as their main manifestation. The initial BVAS scores in adults were 10+ 4.6 and pediatric PVAS were 7+1.7. All patients received corticosteroids on diagnosis of AAV. One adult required two inductions with rituximab and had one disease flare. Another adult required 6 treatments with IV cyclophosphamide for 5 disease flares. Two pediatrics patients received methotrexate and the third azathioprine for induction. None of the children had flares. For maintenance therapy, two adults received azathioprine and the third methotrexate. Two children were maintained on methotrexate and the third on azathioprine. One adult and two children achieved remission (off prednisone 6 months). Two adults and two children received endoscopic surgical treatment for SGS. All of the adults had persistent SGS while two pediatric cases achieved resolution of their SGS.

Conclusion: Subglottic stenosis in the setting of AAV differs between adult and pediatric populations in this small analysis. There was a female predilection for SGS in AAV in children and adults. In the adult cases, more organ systems were affected; there was a trend towards high disease activity and requirement for more immunosuppressive therapy. Our cases also showed that pediatric-onset cases achieved remission more often. Although these findings suggest that children with SGS in AAV fare better than adults, larger studies are required to evaluate this observation.

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Improvement in Mortality in RA Compared to the General Population – Closing the Mortality Gap

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Objectives: Increased mortality in RA is believed to be a consequence of inflammation. With improved treatment, mortality would be expected to decrease over time. Our objective was to compare mortality in RA and general population across incident cohorts of earlier vs. later RA onset.

Methods: We conducted a retrospective cohort study of a population-based cohort, using administrative health data. All incident RA cases in BC who first met previously published criteria for RA between 01/1996-12/2006 were identified. General population controls were randomly selected, matched 1:1 on birth year, gender and calendar year of inclusion. Cohorts were divided into earlier (RA onset 1996-2000) and later (2001-2006) cohorts. Physician visits and vital statistics data, including cause of death, were obtained until Dec 2010. Person-years of follow-up (F/U) were calculated from index date to end of F/U, last health care use, or death. Cases and controls were right censored at 5 yrs of F/U to ensure equal F/U time when comparing earlier and later incident cohorts. Sensitivity analyses including all years of F/U yielded similar results. All cause and cause-specific mortality rates and 95% CI were calculated for RA cohorts and controls, along with mortality rate ratios; as well as hazard ratios (HRs) for mortality in RA vs. controls via exponential regression models adjusting for age and testing differences between incident cohorts via an interaction term.

Results: The sample included 24,914 RA cases and controls (66.5% female; mean[SD] age

57.3[17.4] years) contributing 112,431 and 113,100 person-years, resp., with 2747 and 2123 deaths in RA and controls, yielding an all-cause mortality rate ratio of 1.30 (95%CI:1.23;1.38). Mortality risk in RA vs. controls differed across incident cohorts. Mortality was significantly increased in RA vs. controls in earlier, but not later, incident cohorts, for all-cause [aHR(95%CI): 1.55(1.43; 1.68) & 0.98(0.90; 1.06)], CVD [(1.58(1.38; 1.80) & 0.92(0.80; 1.06)], and cancer [1.46(1.26; 1.70) & 0.89(0.76; 1.04) mortality; and remained increased for infection mortality [1.83(1.29; 2.60) & 1.41(0.98; 2.03)], in earlier & later cohorts. In adjusted models, a significant interaction between RA (vs. controls) and incident cohort (earlier vs. later) was found ($p<0.001$) for all-cause, CVD and cancer, but not infection ($p=0.31$) mortality.
Conclusion: In our population-based incident RA cohort, the risk of mortality compared to the general population has improved over time. The mortality gap between RA and the general population present in people with RA onset on or before 2000 was not observed in people with RA onset after 2000.

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Proof of Concept Study of the Arthritis Health Journal: An Online Tool to Promote Self-Monitoring in People with Rheumatoid Arthritis (RA)

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Objectives: Patient passports have been used in chronic diseases to promote active involvement of patients in their care. In RA, patient monitoring of their disease activity could facilitate treat to target by providing early warnings when RA is not controlled. We performed a proof of concept study of the Arthritis Health Journal (AHJ), a patient-centered online tool that helps RA patients track symptoms, monitor disease activity and develop action plans.
Methods: Participants, recruited from arthritis clinics, newsletters and advertisements, were randomly assigned (1:1) to immediate or delayed group (i.e. intervention after 6 months). Participants received online access to the AHJ for 6 months (no frequency of use specified). The tool consists of 6 sections: 1) symptom and exercise log; 2) disease activity assessment; 3) mood assessment; 4) medical information; 5) goals and action plans; 6) health reports. On-line questionnaires every 3 months evaluated frequency of use, satisfaction, self-management, consumer effectiveness, and health status. Semi-structured interviews were conducted on a purposive sample selected to represent a variety of experiences with the AHJ.
Results: 94 participants were recruited; mostly women (88%), Caucasian (78%), mean(SD) age: 52.9(11.0) and RA duration: 12.5(10.6) years. The AHJ was used less frequently than expected. Disease activity was the most frequently used section [median(25Q;75Q) use over 3 months: 1.0 (0; 3)], with 44% not using it and 27% using it > 3 times over 3 months. User satisfaction was moderate to high across sections (median from 6.3 to 7.8 on 1-10 scale), with highest satisfaction with disease activity section. No between groups differences were observed in consumer effectiveness attributes or health status over 6 months. Perceived benefits of the AHJ mentioned in interviews included enhanced self-awareness, ability to see relationships between symptoms and patterns over time in symptoms and disease activity, which were felt to facilitate medical-decision making during medical visits. Barriers to use included lack of perceived need when

disease was stable, well-controlled or longstanding (stating they would have used it at disease onset), internal factors (e.g. fatigue, unwillingness to focus on disease, denial), and external factors (lack of time due to life events).
Conclusion: Our proof of concept study shows that people were satisfied with the AHJ, but many used it infrequently for a variety of reasons. No differences between groups were detected in consumer attributes or health status; however, 6-month might be insufficient for such changes. Participants identified a number of benefits, especially those who used it frequently. Supported by a CIORA grant.

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Occurrence of Serious Infection in Patients with Rheumatoid Arthritis Treated with Biologics and Denosumab Observed in a Clinical Setting

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Objectives: Previous studies combining immunosuppressive biologics (IB) have shown increased infection risk. Few studies have examined the infection risk with concurrent use of the anti-osteoporosis agent, denosumab (DMAb), and an IB to treat rheumatoid arthritis (RA). This study examined the occurrence of serious and opportunistic infections in two RA populations: patients treated concurrently with DMAb and an IB, and patients treated with only an IB.
Methods: We reviewed RA patients from two rheumatology practices in Hamilton, Ontario, between July 01, 2010 and July 31, 2014. Patients were included if they were ≥ 18 years of age with RA, registered in the treatment center ≥ 3 months before and after the index date, and received ≥ 1 injection/infusion or filled a prescription for an IB RA-therapy. Patients were excluded if they had HIV/AIDS, were receiving cancer treatment or immunosuppressive therapies for non-RA conditions , or were living in a nursing home. We examined two RA patient groups: those who had used DMAb and an IB concomitantly (concurrent group) and those who had used an IB alone (biologic-alone group). The concurrent group was assigned an index date derived from their initial DMAb injection. A frequency-matching technique utilizing the index date of the concurrent group was used to select the index date of the biologic-alone group. Serious infection was defined as resulting in hospitalization or an ER visit with use of IV antibiotics, with the primary diagnosis of infection. Instances of serious or opportunistic infections were recorded. The observational period for infections was between the index date and July 31, 2014 or loss to follow-up, whichever came first. As this was not a comparative study, each group was analyzed separately.
Results: A total of 218 patients met eligibility criteria (N = 109 concurrent group; N = 109 biologic-alone group). Three events of serious infection occurred in three patients in the concurrent group (three cases of pneumonia resulting in hospitalization), and three events of serious infection occurred in three patients in the biologic-alone group (two cases of pneumonia and one upper respiratory tract infection, all resulting in hospitalization). In both groups, all patients recovered and there were no instances of opportunistic infections or death.
Conclusion: RA patients may require treatment for bone loss due to intrinsic disease, steroid

use, and advancing age. This study demonstrates a low occurrence of serious infections in biologically-treated RA patients, including patients with concurrent DMAb use.

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The Use of IVIG in a Complicated Case of Rheumatoid Arthritis

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Rheumatoid arthritis (RA) is a chronic, systemic, inflammatory disorder of unknown etiology that typically presents with symmetric polyarthritis. RA has the potential to lead to significant joint damage as well as multi-organ complications. However, what was once known as a crippling disease with few treatment options has evolved into a chronic disease with many treatment choices. The development of disease-modifying antirheumatic drugs (DMARDs) as well as biologics has changed the prognosis of this disease in recent years, and it is now rare to see patients with end-stage complications. However, certain clinical circumstances can limit the use of these medications. We present the case of a 54-year-old female with a 27-year history of rheumatoid arthritis who had been lost to follow-up for eight years. She had previously failed, or developed complications to multiple therapies including hydroxychloroquine, methotrexate, azathioprine, and gold. On physical exam she had significant deformities in multiple joints and x-rays showed destructive changes in multiple areas including the elbows, wrists, fingers, knees, ankles and toes. She had previously required bilateral hip and left knee replacements, and a few months prior had undergone spinal fusion from the occiput to T2 due to severe cervical myelopathy. As a consequence of being bed-bound post surgery, she developed infected sacral wound ulcers. More recently she presented to the emergency department with congestive heart failure. Beyond the extensive, chronic joint deformities on physical exam, active synovitis and joint tenderness was still present in multiple joints. Given the patient's multiple comorbidities, and previous drug failures, DMARDs and biologics were deemed unsafe. Subcutaneous Intravenous Immunoglobulin (IVIG) was initiated as an alternate treatment option given the patient's active infections and congestive heart failure. Our aim is to present a case of severe deforming rheumatoid arthritis and review the literature regarding the use of IVIG as a potential treatment option for this disease.

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Health-Related Quality of Life in Early Idiopathic Inflammatory Myopathy

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Objectives: Health-related quality of life (HRQoL) is a research priority in chronic diseases. Yet, there is a paucity of HRQoL data in rare diseases, including idiopathic inflammatory myopathy (IIM). The objective of this study was to explore the magnitude of impairment in HRQoL, measured using the Medical Outcomes Trust Short Form-36 (SF-36), and the clinical correlates of physical HRQoL in early IIM.

Methods: Cross-sectional study of incident IIM subjects enrolled in the Canadian Inflammatory Myopathy Study cohort. Subjects were assessed at entry with standardized clinical histories, medical examinations, and self-administered questionnaires. Multiple linear regression was used to assess the relationship between selected demographic and clinical variables and the SF-36 Physical Component Summary (PCS) score. Norm based scoring, where the mean score for the

general population is 50 with a standard deviation (SD) of 10, was used to score SF-36 domain and summary scores.
Results: The study included 38 IIM patients (70% woman, mean (±SD) age 50.1±14.4 years, mean disease duration 1.3±1.5 years) with dermatomyositis (16; 43%), clinically amyopathic dermatomyositis (7; 19%), connective tissue disease-associated myositis (9; 24%), polymyositis (4; 11%) and cancer-associated myositis (2; 3%). Mean manual muscle testing-8 score (MMT8, range 0-150) was 142.3±15.5, median Myositis Disease Activity Assessment Visual Analogue Scales (MYOACT) was 8.3% [IQR 3.3%, 16.7%], mean physician-reported skin activity score (range 0-10) was 1.5±1.8, and mean Health Assessment Questionnaire (range 0-3) was 1.0±0.8. Common clinical findings included interstitial lung disease (ILD, n=23; 62%), inflammatory arthritis (13; 35%) and dysphagia (9; 24%). There were considerable impairments in all 8 SF-36 domains, with the largest almost 2 SD below that of the general population in physical functioning (mean 32.7±13.8) and role-physical (32.0±11.9). Impairment was 1.5 SD below that of the general population in the SF-36 PCS (35.5±11.1) and 1 SD below in the mental component summary score (40.5±13.1). In multiple linear regression analysis, there was a strong association between ILD and the SF-36 PCS (β -10.39, 95% confidence interval -20.92; 0.15, p=0.053). The model explained 47% of the variance in the SF-36 PCS.
Conclusion: HRQoL in IIM patients is considerably impaired, particularly in the physical domains. The presence of ILD in early IIM was independently associated with a clinically meaningful reduction in self-reported physical health status. Optimizing treatment of ILD has the potential to improve HRQoL in IIM. Ongoing recruitment into the cohort will permit more robust estimation of HRQoL in IIM and its subsets.

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From Childhood to Adulthood: Longitudinal Trajectory of Damage in Patients with Childhood-Onset Systemic Lupus Erythematosus (cSLE)

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Objectives: Outcomes of patients with cSLE over time and into adulthood are poorly understood. No information about the longitudinal trajectory of organ damage in cSLE patients is available. We undertook this study to: 1) To determine the longitudinal damage trajectory– as measured by the American College of Rheumatology/ SLE International Collaborating Clinics SLE damage index (SDI)– in patients with cSLE. 2) To identify both baseline and disease course (time-varying) predictors of damage trajectory.
Methods: Single centre, retrospective, inception cohort. We included 473 patients diagnosed and followed, from 1st January 1985 to 30th September 2011. Patients were included if: <18 years at diagnosis, have satisfied the ACR classification criteria for SLE, were treated for <3 months with steroids or an immunosuppressant for any other disease, and have had >= 3 visits. Longitudinal pediatric data was obtained from our research database; adulthood data was obtained from either a research database or patients' charts. Clinical information at every visit was collected: SLEDAI2K, SDI, laboratory results, and medications. Predictors were identified using a weighted generalized estimating equation (WGEE). Time-varying predictors: disease activity, items of SLEDAI2K, corticosteroid, immunosuppressant and antimalarial exposures, were lagged by 6, 12, 18 and 24 months in different models.
Results: 14% of patients were lost to follow-up. We studied 14097 visits, 3290 patient-

years. The median follow-up duration was 5.5 years. The median age at diagnosis was 14.1 years and median age at last visit was19.5 years (range 6.0–41.9 years). 65% of patients were >18 years old at last follow-up. The predicted average population damage was 0.7 at 5 years, 1.3 at 10 years, 1.9 at 15 years, 2.3 at 20 years and 2.7 at 25 years. Cataract (14%) was the most common item of damage, followed by avascular necrosis (10%) and osteoporosis (5%). Only 2 patients had myocardial infarctions. Life-threatening major organ manifestations predicted higher initial damage but the accrual of damage slowed down over time. Higher prednisone dose (12, 24 months before) and the use of cyclophosphamide (6, 12,18, 24 months before) predicted an increased damage trajectory at current visit. Antimalarial exposure (6 months before), mucosal ulcers (6,12,18,24 months before) and pericarditis (6 months before) were protective against an increase in damage trajectory.

Conclusion: Patients with cSLE accrue damage steadily throughout their disease course into adulthood. We identified the baseline factors that predicted greater and accelerated damage trajectory. Over time, SLE clinical features and therapeutic exposures, predicted a change in damage trajectory.

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From Childhood to Adulthood: Identifying Latent Classes of Disease Activity Trajectories in Childhood-onset Systemic Lupus Erythematosus Patients

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Objectives: Although SLE patients are thought to follow different patterns of disease courses, no information is available about the longitudinal disease activity or the number of possible different disease courses. This study sought to: 1) determine the longitudinal disease activity trajectory in childhood-onset SLE (cSLE) patients; 2) determine the number of latent classes of disease activity trajectories and 3) identify factors predictive of membership in different disease trajectories.

Methods: Single centre longitudinal inception cohort of cSLE patients (onset <18 years) diagnosed and followed from Jan 1985 to Sep 2011. Clinical data from childhood to adulthood was obtained: pediatric data from our institutional cSLE database, adult data from the Toronto Lupus database or extracted from clinical charts from rheumatologists' offices. Longitudinal disease trajectory was constructed using data from every clinic visit in the 1st 10 years after diagnosis. Longitudinal SLE activity is considered a latent construct that is imperfectly measured by the SLE disease activity index 2000 (SLEDAI2K) and prednisone exposure. SLEDAI2K and prednisone use were then jointly modeled in a Bayesian growth mixture model (GMM).

Results: 473 patients were included. 82% were females, median age of diagnosis was 14.1 years. There were 11992 visits, 2666 patient years. By the end of 10 years, 65% of the population had transferred to adult care. Mean population SLEDAI2K and prednisone trajectories of cSLE patients showed rapid decline to low activity levels within 2 years after diagnosis. However, joint GMM showed 5 latent classes were present in this cohort of cSLE patients in the following distributions: 30(6%), 57 (12%), 79 (17%), 92(19%), 215 (45%). Class1 patients have chronic moderate-high disease activity, class 2 had moderate initial disease activity and continued moderate long-term prednisone use, class 3 had initial high disease activity but achieved long-term remission, class 4 had high initial disease activity but relapsed later, class 5 had chronic low-grade disease activity. Across all classes, there was chronic use of prednisone (at least 5-10

mg/day) among cSLE patients in the first 10 years after diagnosis. Baseline major organ involvement, ethnicity, age at diagnosis and the number of baseline ACR criteria predicted membership in different classes.
Conclusion: cSLE patients could be subclassified into 5 distinct classes of disease activity trajectories. Baseline organ involvement and personal demographic factors could predict membership in the distinct disease activity trajectory classes.

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Childhood Diffuse Alveolar Hemorrhage

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Objectives: Childhood diffuse alveolar hemorrhage (DAH) is a rare, life-threatening condition. Devastating lung bleeds can occur in isolation or in the context of systemic diseases. Early recognition and rapid initiation of effective, targeted therapies improve patient outcomes including survival. The objective was to synthesize the published evidence and develop an evidence based, comprehensive diagnostic algorithm for suspected diffuse alveolar hemorrhage in children.
Methods: A literature review of primary and secondary diffuse alveolar haemorrhage in children was conducted, including case reports, review articles, and original research papers. The spectrum of disease entities associated with DAH was identified. Diseases were grouped based on pathomechanisms. Characteristic symptoms and associated laboratory, imaging and histology findings of DAH were identified. The available evidence for the best diagnostic evaluation was synthesized and diagnostic algorithm was developed.
Results: A total of 100 publications were reviewed. Childhood DAH was characterized by pulmonary symptoms of dyspnea, cough and hemoptysis in conjunction with anemia and evidence of alveolar filling on CT or radiograph. Importantly, children often had no evidence of hemoptysis. The most common causes of DAH in children were infection, cardiovascular conditions, environmental exposures, ANCA-associated vasculitides and systemic lupus erythematosus. Other causes of pediatric DAH included IgA vasculitis, IgA nephropathy, anti-glomerular basement membrane disease, idiopathic pulmonary hemorrhage, idiopathic pulmonary capillaritis, vascular fragility and novel genetic mutations including the COPA mutation. Serological, histological, imaging and genetic testing was mandatory to confirm the diagnosis. Immunological testing for specific antibodies should be conducted, Genetic testing should target vascular Ehler’s Danlos and COPA mutations. For patients with evidence pulmonary-renal syndrome, an elective renal biopsy had a significantly higher yield than lung biopsy . For children with skin lesions, an incisional biopsy should be considered. Lung biopsy in DAH was a high risk procedure. It provided confirmation of DAH, but did infrequently identify the underlying cause.
Conclusion: In children, DAH is a critical condition that requires immediate attention. A rapid, thorough investigation for secondary causes of lung bleeds is mandatory. The proposed diagnostic algorithm can guide the evaluation. Treatment of DAH should be initiated rapidly and should target the underlying diagnosis, if applicable.

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Risk Factors for Poor Health-Related Quality of Life in Children with Inflammatory Brain Diseases

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Objectives: Inflammatory Brain diseases (IBrainD) are increasingly recognized causes of devastating neurological deficits in previously healthy children. Although the mortality has dramatically improved, disease and treatment related morbidity and impact on health-related quality of life (HRQoL) remain unclear. Therefore the purpose of this study was to determine the HRQoL in children with IBrainD and identify factors at diagnosis associated poor HRQoL.

Methods: A multicenter, observational cohort study of children diagnosed with IBrainD at all participating sites of the BrainWorks network was conducted. Children age <18 years at time of diagnosis, who were followed for at least 12 months were included.. HRQoL was measured using the Pediatric Quality of Life Inventory Version 4.0 (PedsQL) Generic Core Scales. The total PedsQL score and the physical and psychosocial subdomains were assessed. The relationship between the parent's perceived HRQoL of the child and the child's perceived HRQoL were explored. Independent variables evaluated included diagnosis, age at diagnosis, gender, time to diagnosis, presence of clinical symptoms at diagnosis, baseline disease activity as rated on the Physician's Global Assessment analog scale and neurological functioning at 1 year. The baseline clinical symptoms considered included seizures, hemiparesis and cognitive/behavioural dysfunction. Outcome: Impaired HRQoL as defined by PedsQL. Analyses of trends were performed using regression models adjusted for repeated measures.

Results: 140 patients were included in the study. The average age at diagnosis in this cohort was 9.8 years (Range= 0.4-18.4). Angiography-negative (small vessel) childhood primary angiitis of the CNS was the most common diagnosis. Statistically significant improvements in total PedsQL scores were associated with the absence of seizures ($p<0.01$) and the absence of cognitive and behavioural dysfunction at baseline ($p<0.01$). Increases in the physical functioning subdomain score ($p<0.01$) and the psychosocial subdomain score ($p<0.01$) were observed if seizures were absent. In the absence of cognitive and behavioural dysfunction, improvement was seen in the psychosocial subdomain score ($p<0.01$). Gender ($p=0.36$) or presence of hemiparesis ($p=0.45$) showed no difference in the total PedsQL score. Identical prognostic factors were found in the parent PedsQl as for the child's PedsQL scores.

Conclusion: Children with IBrainD presenting with seizures and cognitive dysfunction at time of diagnosis were at highest risk for poor HRQoL over time. Tight seizure control and early cognitive rehabilitation are mandatory. Additional resources should therefore be considered and allocated to children presenting with these symptoms, including extended rehabilitative services and counselling focused on improving psychosocial HRQoL.

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The Impact of Obesity on Remission and Disease Outcomes in Rheumatoid Arthritis: A Systematic Review and Meta-Analysis

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Objectives: Obesity is a risk factor for the development of rheumatoid arthritis (RA) but protects against radiographic progression. We conducted a systematic review and meta-analysis to explore the association between obesity and disease activity measures in RA.
Methods: A Medline search was performed (to May 2015) using relevant MeSH and keyword terms for obesity and RA. Articles were selected for inclusion if they reported estimates for achieving remission, composite or individual disease activity measures, patient-reported outcomes or mortality rates, comparing obese to non-obese body mass index (BMI) categories, or in relationship to BMI on a continuous scale. Remission outcomes were conducive to meta-analysis and all other outcomes were synthesized.
Results: A total of 1,281 records were screened. Eight manuscripts reported remission rates, 23 characterized disease activity measures or patient-reported outcomes, and 3 examined mortality by obesity status or BMI. In meta-analysis using the most adjusted estimates, obese patients demonstrated lower odds of achieving remission at any point (pooled adjusted OR 0.53; 95%CI 0.41, 0.69) and sustained remission (pooled adjusted OR 0.49; 95%CI 0.32, 0.74). In sensitivity analysis using crude estimates, obese patients also had reduced odds of achieving remission (pooled OR 0.35; 95%CI 0.18, 0.71). Associations of obesity and individual disease activity measures and patient-reported outcomes were inconsistent, although most studies found obese patients to have higher DAS28, ESR, patient global, pain and HAQ scores during follow-up. Obese patients had worse quality of life in all studies (n=3). Obesity was not associated with increased mortality.
Conclusion: Obesity decreases the odds of achieving remission in RA, and is associated with decreased quality of life. Interventions to reduce BMI should be investigated for the ability to improve disease outcomes.

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A Comparison of Current Practice to New Vasculitis Treatment Guidelines

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Objectives: Corticosteroid therapy has been used as an adjunct to immunosuppressive medications in the treatment of anti-neutrophil cytoplasmic antibody (ANCA) associated vasculitis (AAV) for many years. In 2015, the Canadian Vasculitis Research Network (CanVasc) produced guidelines regarding the management of AAV. Included in these guidelines were recommendations regarding the use of corticosteroids in the induction of remission and treatment of flare in AAV. Our study compares current practice at one major teaching hospital in Alberta, Canada with the recently published CanVasc guidelines.
Methods: Patients were identified from outpatient clinic records at the University of Alberta Hospital in the Divisions of Rheumatology, Nephrology and Respirology. Patients with a clinical diagnosis and positive ANCA or patients with pathology consistent with AAV and corticosteroid use were included. Patients with a diagnosis of vasculitis other than AAV, limited disease not requiring corticosteroids, or those without adequate documentation to determine length of corticosteroid therapy prior to taper were excluded. De-identified data was collected regarding maximum dose and length of prednisone therapy to initiation of taper during either initial induction of remission or flare.
Results: We identified a total of 34 patients with AAV. Complete data for initial flare was available in 28 patients, with 33 disease flares identified. Seven patients received pulse IV corticosteroids with induction of remission. Prednisone was the only corticosteroid used for initial therapy with an average initial dose of 57 mg. The duration of corticosteroid use for initial

flare was 7.0 weeks, however 6 patients did not have clearly documented duration to taper. For subsequent flares two patients required steroid pulse with the initial oral corticosteroid dose of 34.8 mg.
Conclusion: Given the relapsing nature of AAV and the consequences of accumulated damage in the setting of active vasculitis, prolonged therapy with glucocorticoids may be indicated in some patients. However, the known side effects of prolonged corticosteroid exposure may offset clinical benefit from therapy. Future studies on the ideal length of corticosteroid therapy during induction of remission in AAV are needed.

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Case Presentation: PRES in the Setting of Goodpasture Disease Treated With Cyclophosphamide

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Introduction: We present the case of a patient who developed PRES (Posterior Reversible Encephalopathy Syndrome) in the setting of anti-glomerular basement membrane (anti-GBM) antibody disease treated with Cyclophosphamide. Although the patient had a complicated hospital stay, the trigger for PRES was believed to be Cyclophosphamide, and the patient improved when this agent was withdrawn.
Case Presentation: A 21 year old healthy woman presented with fatigue and hemoptysis, and was found to also have acute kidney injury. Urinalysis demonstrated granular and red cell casts. She required emergent intubation for severe hypoxemic respiratory failure and was started on dialysis. Bronchoscopy revealed acute pulmonary hemorrhage. Anti-GBM antibodies were positive at a high titer (440 CU). Kidney biopsy was consistent with anti-GBM antibody disease with crescentic glomerulonephritis and linear staining of the basement membrane with IgG. She was initially treated with pulse methylprednisolone, IV Cyclophosphamide and plasmapheresis. Her course in hospital was complicated by ARDS, pulmonary embolism and ongoing pulmonary hemorrhage likely secondary to supratherapeutic INR. As she was recovering, she developed the acute onset of headache, blurry vision and severe agitation. CT head was negative for intracranial bleeding but showed symmetric hypodensities in the parieto-occipital lobes and both cerebellar hemispheres, suggestive of PRES syndrome. Cyclophosphamide was considered as the trigger to the development of PRES in this patient and was discontinued. Patient improved following discontinuation of Cyclophosphamide.
Discussion: PRES remains a poorly understood condition. Several hypotheses regarding the etiology of PRES have been put forward including failure of autoregulation, cerebral ischemia and endothelial dysfunction, with the latter being the likely etiology by which Cyclophosphamide might have triggered PRES in this case. PRES syndrome has also been reported as an adverse effect of a number of immunosuppressive therapies. Cyclosporine is reported more frequently than other medications like Tacrolimus, Sirolimus, Cisplatin, Interferon therapies and agents that target angiogenesis such as Bevacizumab. The occurrence of PRES in a patient with a life-threatening vasculitis illness, where the culprit could be the disease or the treatment, proposes a significant dilemma for clinicians.

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Clinical and Imaging Efficacy of Etanercept in Early Non-Radiographic Axial Spondyloarthritis: 104-Week Treatment Results

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Objectives: In the multiphase, randomized, placebo (PBO)-controlled EMBARK study (ClinicalTrials.gov identifier: NCT01258738), clinical signs/symptoms and MRI-measured inflammation were evaluated in patients with early, active non-radiographic axial spondyloarthritis (nr-axSpA) after 12 wks of double-blind treatment with etanercept (ETN) and 92 wks of open-label ETN.
Methods: Patients who satisfied Assessment of SpondyloArthritis international Society (ASAS) classification criteria for axSpA, but not modified New York radiographic criteria, and who were unresponsive to ≥2 NSAIDs received double-blind ETN 50 mg/wk or PBO for 12 wks, followed by open-label ETN 50 mg/wk (ETN/ETN or PBO/ETN) to wk104. All patients continued background NSAIDs. Pre-specified analyses of conventional clinical assessments included ASAS, ASDAS (high-sensitivity CRP), BASDAI, and BASFI; the Spondyloarthritis Research Consortium of Canada (SPARCC) scoring method was used for MRI assessment of SI joint and spine inflammation. Post-hoc analysis of sustained ASDAS remission (ASDAS <1.3 for ≥24 continuous wks over 104 wks; no missing data) was also conducted. Binary and continuous endpoints were analyzed in all patients who were included in the modified intent-to-treat (mITT) population in the double-blind period using non-responder imputation and last-observation-carried-forward approaches, respectively. A Cochran-Mantel-Haenszel chi-square test and ANCOVA were used for between-group comparisons of binary and continuous endpoints, respectively, at wk12.
Results: Of 215 randomized patients (double-blind-phase mITT population), 205 entered and 169 completed the open-label phase (ETN/ETN, n=100/n=83; PBO/ETN, n=105/n=86). At the end of the double-blind phase (wk12), 33% (ETN) and 15% (PBO) of patients achieved ASAS40 (P<0.01), and 40% (ETN) and 17% (PBO) achieved sustained ASDAS remission (P<0.001). At the end of the open-label phase (wk104), 49% (ETN/ETN) and 51% (PBO/ETN) of patients achieved ASAS40. By wk104, 51% (51/100) and 58% (61/105) of ETN/ETN- and PBO/ETN-treated patients achieved sustained ASDAS remission. Significantly greater mean reductions from wk0-12 in SPARCC SI joint and spinal scores were seen in patients receiving ETN vs PBO (-3.8 vs -0.8, P<0.001; -2.1 vs -1.2, P<0.05); between wks0-104, these scores decreased by -5.4 and -3.5 (SI joint) and -1.9 and -0.8 (spinal) in patients receiving ETN/ETN and PBO/ETN. From wk0-104, 8% (ETN/ETN) and 7% (PBO/ETN) of patients had serious adverse events; no new safety signals were seen.
Conclusion: Patients with early, active nr-axSpA and inadequate response to NSAIDs demonstrated improvement in clinical and imaging outcomes that was sustained through 104 wks of etanercept treatment.

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Modification of Structural Lesions on Magnetic Resonance Imaging by Etanercept: A 12-week Randomized Placebo-Controlled Trial

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Objectives: Modification of structural lesions by anti-TNF therapy has not been demonstrated in a randomized placebo (PBO)-controlled trial. This analysis evaluated the impact on the structural lesions of fat metaplasia (new tissue growth after resolution of inflammation), erosion, backfill (new tissue growth at erosion site), and ankylosis at 12 weeks in patients with non-radiographic axial SpA receiving PBO or etanercept (ETN) in the EMBARK study (ClinicalTrials.gov: NCT01258738).

Methods: Patients had axial SpA per ASAS criteria without meeting modified NY radiographic criteria; BASDAI score ≥4; symptoms for >3 months and <5 years; and had failed ≥2 NSAIDs. Patients were randomized to double-blind ETN 50 mg/week or PBO for 12 weeks, then received open-label ETN. Structural lesions were scored using the Spondyloarthritis Research Consortium of Canada (SPARCC) sacroiliac joint (SIJ) structural (SSS) method on T1-weighted spin echo (T1WSE) MRI. Two readers independently scored baseline and 12-week T1WSE MRI scans, blinded to patients, time point, and inflammation scores assessed by short tau inversion recovery MRI scans. Readers' mean scores were used.

Results: Mean (SD) age was 32 (7.8) years, 60.5% were male, duration of disease symptoms was 2.4 (1.8) years, 71.6% were HLA-B27 positive, and 80.9% had sacroiliitis on MRI (modified intent-to-treat [mITT] population, N=215). MRI scans from 185 patients (ETN, n=88; PBO, n=97) with baseline and 12-week scans were reviewed. At baseline, there were no significant differences in mean (standard error [SE]) SPARCC SSS scores for ETN vs PBO for any structural lesions: erosion: 2.25 (0.33) vs 1.73 (0.32), respectively; backfill: 0.76 (0.22) vs 0. (0.20); fat metaplasia: 0.50 (0.19) vs 0.27 (0.09); and ankylosis: 0.15 (0.10) vs 0.13 (0.11). From baseline to 12 weeks, SPARCC SSS score mean (SE) change was significantly greater for ETN than PBO for erosion: -0.57 (0.16) vs -0.08 (0.10), respectively, P=0.009, and backfill: 0.36 (0.12) vs 0.06 (0.06), P=0.021, 2-sample t-test. These treatment differences remained significant after adjusting for baseline SPARCC SSS scores using analysis of covariance models. The change in SPARCC SSS score did not differ significantly between ETN and PBO for fat metaplasia: 0.06 (0.07) vs 0.05 (0.05), respectively, or ankylosis: 0.01 (0.01) vs 0.01 (0.01).

Conclusion: Treatment with ETN was associated with a significantly greater reduction in erosion and increase in backfill at 12 weeks vs. PBO, consistent with a very early reparative response to anti-TNF therapy. The impact of this new data on disease progression in SpA should be studied further.

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Baseline Characteristics of Early, Delayed, and Non-Responders in a Non-Radiographic Axial Spondyloarthritis Study

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Objectives: Data from EMBARK (ClinicalTrials.gov identifier: NCT01258738) suggest the time point of 24 weeks may be more appropriate than 12 weeks for evaluating response to etanercept (ETN). This analysis compared the baseline characteristics of patients with early, delayed, and no treatment response.

Methods: Patients had axial SpA per ASAS criteria without meeting modified NY radiographic criteria; BASDAI score ≥4, disease symptoms for >3 months and <5 years, and had failed ≥2 NSAIDs. Patients were randomized to double-blind ETN 50 mg/week or placebo for 12 weeks,

then received open-label ETN 50 mg/week. This analysis includes the open-label modified intent-to-treat (mITT) population that was randomized to ETN. For ASAS40 response, patients were split into 3 groups: early (12-week) responders, delayed (24-week) responders, and non-responders. Observed case (OC) analysis was performed. Comparison of baseline characteristics used one-way analysis of variance with treatment as a factor for continuous variables and Fisher's exact test or chi-square test for yes/no variables.
Results: 99 patients were in the mITT population, OC analysis: ASAS40 week 12 responders, n=35; ASAS40 week 24 responders, n=15; ASAS40 non-responders, n=49. Mean (SD) age was 31.8 (7.8) years, .7% were male, and duration of disease symptoms was 2.4 (2.0) years; 66.7% of patients were HLA-B27 positive and 83.8% had sacroiliitis on MRI (P=ns across response groups for all). For ASAS40 responses, there were significant baseline differences among response groups for the following: CRP, BASDAI, BASFI, ASDAS-CRP, patient global assessment, total back pain, inflammation, and Spondyloarthritis Research Consortium of Canada (SPARCC) SIJ score and 6-DVU spinal score. Of note, mean (SD) CRP values were 11.6 (14.7), 3.1 (3.0), and 5.3 (7.9) mg/L for the 12-week, 24-week, and non-responders, respectively, P=0.0106. Additionally, ASDAS-CRP was 3.5 (0.9), 2.9 (0.7), and 2.7 (0.9), P=0.0001; total back pain (0-10 cm VAS) was 6.5 (2.1), 5.8 (1.6), and 4.6 (2.6) cm, P=0.0003; and SPARCC MRI SIJ score (0-72) was 12.7 (11.4), 7.0 (7.9), and 5.2 (7.8) for the 12-week, 24-week, and non-responders, respectively, P=0.0007. Overall, baseline disease characteristics were more severe for responders than non-responders, and most severe for early responders. No significant baseline differences existed in MASES score, physician global assessment, or prior response to NSAIDs, per ASAS40 response.
Conclusion: Evaluating ASAS40 results according to early, delayed, and no response demonstrated significant differences in several baseline clinical characteristics and SPARCC MRI scores. These results may aid clinicians in treating patients with nr-axSpA.

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Defining the Optimal 14-3-3η Threshold to Predict Worse Radiographic Outcomes in Patients with Recent-Onset Inflammatory Arthritis

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Objectives: 14-3-3η is a joint derived mechanistic marker that up-regulates factors that perpetuate disease. Higher or persistent levels of serum 14-3-3η protein are associated with a worse prognosis, and a corresponding decrease in circulating levels is associated with better clinical outcomes. The manufacturer defined a positivity cut-off for diagnostic purposes of ≥0.19 ng/ml based on ROC curve analyses. Our objective was to define the best baseline 14-3-3η cut-off to predict radiographic progression over the following 5 years.
Methods: Baseline serum 14-3-3η titres were assessed in recent onset polyarthritis patients from the Sherbrooke EUPA Cohort in which 5 years of radiographic follow-up data assessed according to the Sharp/van der Hiejde (SvH) score were available. Receiver Operating Characteristics (ROC) curve were used to establish the optimal threshold of baseline 14-3-3η

positivity for prediction of definite radiographic progression (ΔSvH ≥5) or erosive progression (ΔErosion) from inclusion to 3 or to 5 years. Generalized estimating equations (GEE) with repeated measures was used to predict risk of ΔSvH ≥5 and ΔErosion ≥5 over 5 years. Results of GEE were presented with relative risk (RR) and 95% confident interval (95% CI).
Results: The 331 patients were DMARD naïve at Baseline, median age 60 years, and 62% female. At baseline, 153 (46%) patients were 14-3-3η ≥0.19 ng/ml. Being ≥0.19 ng/ml was associated with more radiographic progression (GEE: RR 1.40 (1.11-1.77), p=0.004) and more erosive progression (RR 1.77 (1.31-2.38), p<0.001) over 5 years. Depending on the threshold for ΔSvH or ΔErosion chosen (3, 5 or 10 units) and the length of observation (3 to 5 years), optimal levels of baseline 14-3-3η defined by ROC curve varied between 0.44 and 0.50 ng/ml. The threshold of 0.50 ng/ml was associated with more radiographic progression over 5 years (ΔSvH: RR 1.60 (1.28-2.00), p<0.001; ΔErosion: RR 2.04 (1.53-2.70), p<0.001). The 31 patients with baseline 14-3-3η levels between 0.19 and 0.49 ng/ml and the 169 patients with levels <0.19 ng/ml had similar risk for ΔSvH (RR 0.86 (0.52-1.43), p=NS) and ΔErosion (RR 0.93 (0.51-1.70), p=NS). Compared to those with 14-3-3η ≥0.19 but <0.50 ng/ml, the 122 patients with levels ≥0.50 ng/ml had higher risks for definite radiographic progression (ΔSvH ≥5; RR 1.82 (1.11-3.00), p<0.05) and erosive progression (ΔErosion ≥5; RR 2.15 (1.21-3.83), p<0.01).
Conclusion: A baseline threshold for 14-3-3η positivity of ≥0.50 ng/ml was superior to ≥0.19 ng/ml to predict worse radiographic outcomes in patients with recent-onset inflammatory arthritis.

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Intravenous Immunoglobulin for the Treatment of Idiopathic Inflammatory Myopathies – A Survey of Canadian Physicians

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Objectives: Although recommended by experts, intravenous immunoglobulin (IVIg) is not licensed for the treatment of IIM (idiopathic inflammatory myositis) in Canada. Moreover, there is a paucity of evidence concerning its use. We undertook this survey to document how Canadian physicians use IVIg for IIM treatment.
Methods: A survey was developed addressing various aspects of IVIg use for IIM, and was vetted for face/content validity by a core team of rheumatologists, neurologists and patient representatives. Members of the Canadian Rheumatology Association, as well as Canadian Inflammatory Myopathy Study and a Canadian network of neuromuscular physicians were invited to participate by an email containing a link to a web-based survey. Descriptive statistics were used to summarize the data.
Results: The survey was sent to 573 physicians, of which 166 participated. Among the 155 respondents who treated IIM, 79.9% were rheumatologists and 18.2% were neurologists. Over 55% were in an academic setting, and the median year of practice was 15 years (IQR [6, 26]). The majority surveyed (68.9%) had 1-10 prevalent cases of IIM currently in their practice, and 92.3% had <10 incident cases per year. Approximately 15% reported that they did not use IVIg for IIM, either because of access problems or preference to refer to other specialists. Physicians who used IVIg generally did so in less than 25% of IIM subjects. IVIg was used for dermatomyositis (91.1%), polymyositis (71.5%), connective-tissue disease-related myositis

(8.6%), necrotizing autoimmune myositis (34.1%), statin-associated HMGCR antibody necrotizing myopathy (23.6%), cancer-associated myositis (22.8%) and inclusion body myositis (5.7%). The most common indications for IVIg were rapidly progressive muscle weakness (78%), diaphragmatic weakness (57.4%) and dysphagia (45.5%). Other indications included cardiac disease (32.1%), moderate/severe skin disease (26.3%) and interstitial lung disease (19.4%). The minority reported using IVIg as first line treatment, either alone or in combination with glucocorticoids and/or DMARDs, and the majority reported using IVIg after failure of steroids and/ or combination therapy. Despite variability in dose and duration of use, the majority reported using 2 gm/kg/month for up to 12 months or until marked improvement. The majority (68.8%) of respondents reported that IVIg was readily available, whereas 31.3% reported that its use was restricted.

Conclusion: The results of this survey demonstrate wide variation and possibly under-utilization of IVIg in IIM treatment, and highlight the knowledge gaps concerning the optimal use of IVIg in IIM.

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Longitudinal, Incremental Direct Medical Costs of Lupus Nephritis amongst a General Population-Based Cohort of Systemic Lupus Erythematosus

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Objectives: Lupus nephritis is a frequent complication of systemic lupus erythematosus (SLE) and tends to strike early after diagnosis, but there are few estimates of the longitudinal, incremental burden of nephritis in those with SLE (extra costs due to treating nephritis) at the population level, and none from Canada. To address this gap, we estimated the five-year, incremental (extra) healthcare costs of lupus nephritis (LN), amongst a population-based cohort of incident cases with SLE, compared to SLE cases without LN.

Methods: Data sources: Our administrative data captured all provincially-funded outpatient visits, investigations, and hospitalizations (from 1990-2010) and all dispensed prescriptions, regardless of funding (1996-2010). SLE cohort: A population-based cohort of incident SLE (no prior SLE encounter from Jan 1990 to cohort entry) for the years 1996-2010 was identified using a validated algorithm: ICD-9/10 code for SLE on ≥ 2 visits from a non-rheumatologist physician or ≥ 1 rheumatologist visit or hospitalization. LN was defined using a validated case definition (>2 renal-coded encounters AND >2 nephrologist encounters), starting anytime from 12-months prior to SLE diagnosis to end-of-follow-up. Cost Calculation: Costs for outpatient services and prescriptions were summed directly from billing data. Case-mix methodology was used for hospitalization costs. Costs were summed from the time of the first LN encounter, or the date of SLE diagnosis for non-LN cases, for up to 5 years. Statistical Analysis: We determined the unadjusted costs of LN (difference in mean per-patient-year (PY) costs between SLE-LN+ and non-LN cases), then used generalized linear models to further adjust for urban/rural residence, neighbourhood income, and Charlson's co-morbidity index at baseline. Costs are reported in 2010 Canadian dollars.

Results: 4,568 incident SLE cases (86% female, mean age=50 years) were followed for 19,139 patient-years, with 303 (7%) eventually meeting the LN definition during follow-up (81% female, mean age 44.5 years). Over the five years, the unadjusted incremental costs of SLE cases with nephritis (SLE-LN+) averaged $52,270/PY, with 61% from hospitalizations

($31,653/PY), 15% medications ($8,004/PY), and 22% from outpatient ($11,510/PY). Following adjustment, 5-year costs for SLE-LN+ cases were 2.8-times greater than non-LN (95% CI=2.5-3.2). Mycophenolate was prescribed to 44% of SLE-LN+ cases (vs. 2% of non-LN), and accounted for 25% of incremental medication costs. Adjusted hospitalization costs amongst hospitalized SLE-LN+ cases were 1.7-times greater than hospitalized non-LN (95% CI=1.5-2.0).

Conclusion: Among newly-diagnosed SLE patients, those with LN incur, on-average, an additional $39,953 in medical costs per-patient-year over five years (after adjustment) compared to those without LN.

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The Rising Prevalence and Incidence of Gout in British Columbia, Canada

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Objectives: Gout is increasingly becoming recognized as the most common form of inflammatory arthritis worldwide; however, no Canadian general population-based data on the disease burden of gout are available. We estimated the incidence and prevalence of gout in an entire Canadian province (British Columbia, BC) from 2000-2012.

Methods: We utilized Population Data BC, an administrative database spanning the province of BC (approximately 4.5 million individuals) that includes all outpatient visits and hospital admissions up to 2012. The primary case definition of gout was at least one recorded diagnosis of gout (ICD-9-CM 274 or ICD-10-CA M10) at either a physician or hospital visit. We additionally explored a secondary case definition of gout comprised of individuals with at least two recorded diagnoses of gout at an outpatient visit or at least one recorded hospitalization for gout. To ensure incident gout cases, we required all newly diagnosed individuals to have at least five years prior without any record of a gout diagnosis. To remove the effect of different age and sex structures over the study period, annual incidence and prevalence estimates were age-sex-standardized using 2012 as the reference. Annual population estimates were obtained from BC Stats.

Results: Of 4,542,508 individuals in BC in 2012, we identified 171,798 prevalent gout cases (68% male, mean age 63 years) for an overall prevalence of 3.78%. The corresponding prevalence in the same calendar year among males and females was 5.12% and 2.39%, respectively. The prevalence additionally increased according to age group, reaching 11.5% among individuals at least 65 years old. We additionally identified 13,605 incident cases in 2012 for an overall incidence rate of 3.10 per 1,000 person-years. The corresponding incidence rates among men and women in 2012 were 4.08 and 2.16, respectively, per 1,000 person-years. Finally, we observed a substantial increase in both gout prevalence and incidence over the entire study period (i.e., from 2000-2012). Similar increasing trends were observed after we applied our secondary case definition of gout.

Conclusion: These findings from BC, representative of the Canadian general population, indicate that the incidence and prevalence of gout are substantial and have increased over the past decade.

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Feasibility of an Approach to Contact Individuals from Administrative Health Data to Estimate the Economic Burden of Systemic Autoimmune Rheumatic Diseases at the General Population Level.

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Objectives: There is a paucity of data on the economic burden of systemic autoimmune rheumatic diseases (SARDs), with most Canadian estimates determined from highly-selected, clinic-based samples. To address this, we are linking administrative health data for a general population-based cohort of SARD cases and controls, with self-reported data collected prospectively from a random sample of these individuals.

Methods: Study Population: Using administrative health data, we established a population-based cohort of all SARD cases in British Columbia (BC) for the years 1996-2010 using a validated algorithm: ICD-9/10 codes from ≥ 1 hospitalization or rheumatologist visit or ≥ 2 visits to another physician. Controls were randomly-selected individuals from the general population matched to cases on sex, age, and entry-year. Survey Sub-Sample: BC Ministry of Health granted us contact information for 6,000 SARD cases and 6,000 controls. Potential participants were mailed an invitation package; non-responders were mailed a follow-up letter after two weeks, and telephoned after four. Survey: Consenting participants completed a survey (paper or online) comprised of validated labour activity questionnaires collecting data on time absent from paid and unpaid work, and working at reduced levels (presenteeism). This data will be used to quantify the productivity losses of SARD cases and associated costs. The survey also collected data on key variables not available in administrative databases including smoking, BMI, ethnicity, household income, educational attainment, levels of pain, fatigue, and disability (using the HAQ-DI), and quality-of-life (using the EQ-5D). Survey data will subsequently be linked to participants' administrative data to assess how these self-reported variables are associated with direct medical costs over time, and productivity costs.

Results: 200 individuals were invited to participate in our pilot, with 69 (34.5%) consenting and 61 (88%) completing the survey (77% online). 28 (46%) reported ≥ 1 SARD diagnosis including 15 SLE, 4 scleroderma, 6 Sjogren's, 1 dermatomyositis, and 6 systemic vasculitides. Controls were 91% female, with mean age 57.6 years. SARD cases were 89% female, mean age 57.7 years, and 50% ever-smokers, with mean BMI 24.2, HAQ-DI 0.56, pain VAS 36, fatigue VAS 47, and utility value 0.78.

Conclusion: Findings from our pilot (34.5% consenting, and 77% of surveys completed online) suggest that directly contacting individuals identified in administrative databases is a feasible way of recruiting a representative sample of SARD cases and controls. Linking survey and administrative data should help fill important gaps about the economic burden of these rare diseases, and improve research using administrative health data.

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Longitudinal, Incremental Direct Medical Costs of Systemic Lupus Erythematosus for the First Five Years after Diagnosis: A General Population-Based Cohort Study

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Objectives: Existing Canadian cost estimates for systemic lupus erythematosus (SLE) have been determined from small, clinic-based populations, mainly over short periods, and without a comparison group. We estimated the incremental (extra) healthcare costs of a general population-based cohort of incident SLE in BC for five years after diagnosis.
Methods: Data sources: Our administrative data captured all provincially-funded outpatient encounters and hospitalizations (from 1990-2010) and all dispensed prescriptions (1996-2010). Cases: A population-based cohort of incident SLE (no prior SLE encounter from Jan 1990 to cohort entry) for the years 1996-2010 was identified using the following algorithm: ICD-9/10 code for SLE on: a) ≥ 2 visits within two-years by a non-rheumatologist physician; or b) ≥ 1 visit by a rheumatologist or from hospitalization. Controls: Randomly-selected individuals from the general population matched to cases 5:1 on sex, age at diagnosis, and index-year. Cost calculation: Costs for outpatient services and prescriptions were summed directly from billing data. Case-mix methodology was used for hospitalization costs. Statistical analysis: Mean per-patient-year (PY) costs were estimated for cases and controls. Generalized linear models were then used to determine the incremental healthcare utilization, and cost ratios between cases and controls, after further adjustment for socioeconomic status (SES, defined by neighbourhood income quintile), urban/rural residence, and Charlson's co-morbidity index at baseline.
Results: We matched 4,568 incident SLE cases to 22,840 controls (86% female, mean age 50±16 years). Unadjusted five-year mean per-PY costs for controls were $12,189 (2010 Canadian) while those for cases were 2.9-times greater ($35,861/PY) with 65% ($15,458/PY) from hospitalizations, 16% ($3,851/PY) outpatient, and 18% ($4,363/PY) from medications. Following adjustment, 5-year costs for cases were 2.5-times higher than matched controls (95% CI=2.4-2.6). The greatest cost difference ($11,505/PY) occurred in the first year after diagnosis (Year 1), when 35% of cases (vs. 14% of controls) were hospitalized. Still, costs for cases remained significantly higher than controls during each of Years 2-5. Being in the lowest-SES group (vs. highest) was also associated with higher costs during Year 1, and this cost increase was 1.4-times greater in low-SES cases than low-SES controls (95% CI=1.2-1.6). Similar longitudinal trends were observed when restricting to those with complete five-year follow-up, including a similar SLE-SES interaction during Year 1 (1.3 (1.1-1.6)).
Conclusion: In this first Canadian estimate of the incremental costs of SLE, newly-diagnosed SLE patients had three-times more medical costs than those without SLE from the general population (extra $23,672/PY over five years), even after adjusting for pre-existing comorbidities.

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Chronic Recurrent Multifocal Osteomyelitis (CRMO) and Synovitis, Acne, Pustulosis, Hyperostosis, and Osteitis (SAPHO) Syndrome: A Report of Four Cases and Review of the Literature

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Objectives: CRMO and SAPHO are rare non-infectious auto inflammatory bone diseases of unknown etiology. Some authors have described these entities as part of the same disease spectrum. CRMO is characterized by recurrent episodes of bone pain and fever, mimicking

infectious osteomyelitis, however cultures of the lesions are sterile and are unresponsive to antibiotics. SAPHO has a dermo-skeletal presentation with negative bacterial cultures and skin manifestations including acne and palmo-pustular lesions. In the differential diagnosis, metastasis, lymphoma, Ewing Sarcoma and atypical infections must be considered. We report 4 cases of adults with CRMO and SAPHO with a focus on clinical evolution and imaging modalities and reviewed the literature for published case reports. CRMO and SAPHO, although rare in adults, should be kept in mind in the differential diagnosis of chronic bone pain or osteomyelitis unresponsive to antibiotic treatment.

Methods: We performed a retrospective review of clinical evolution, treatment strategies and imaging modalities of 4 cases of CRMO (2) and SAPHO (2). A search of MEDLINE and PUBMED was performed for case reports and series published between 1985 and 2015.

Results: Median age of initial symptoms was 29 (range 20 -50). Affected sites were temporomandibular, metaphysis of the long bones, acetabulum, sternoclavicular and manubriosternal joints. Median number of initial bony lesions for each patient was 1.5 (range 1-4) at onset and 2.0 (range 1-5) during the disease course. All patients failed to respond to NSAID therapy. Two patients received corticosteroids, with minimal response. Two patients received bisphosphonates (pamidronate), with initial response, however required further therapy due recurrence of symptoms. After a median follow-up period of 2.6 years (range 1-6), two patients are clinically asymptomatic and two patients remain with chronic residual pain. One patient was initially diagnosed as CRMO but was later found to have lymphoma.

Conclusions: CRMO and SAPHO are rare skeletal disorders in adults, with no validated diagnostic criteria, making the diagnosis challenging. Clinical and imaging investigations are necessary to rule out other diagnostic considerations. Treatment is based on information gathered from case reports and small series, including NSAIDs, DMARDs and bisphosphonates.

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"Honestly I'm very scared of the side effects so I don't, I won't take it ": A Qualitative Study of Adherence to DMARDs in Inflammatory Arthritis Patients

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Objectives: Consistent reports of suboptimal treatment adherence among patients with inflammatory arthritis (IA) highlight the importance of improving the understanding patients' experiences with taking arthritis medications. Despite previous qualitative research on patients' experiences on arthritis medications - namely DMARDs - gaps remain, most notably, the majority of studies have primarily examined only barriers to adherence. Our objective was to fully explore IA patients' experiences and perspectives with DMARDs including facilitators as well as barriers.

Methods: Participants were adults with rheumatologist-confirmed diagnosis of IA and currently taking a DMARD for their IA who were recruited across the Lower Mainland of British Columbia, Canada. A qualitative approach using focus groups was employed to better understand patients' perspectives and experiences with DMARDs ("arthritis medication") and disease management in the context of their encounters with the healthcare system. Focus group transcripts were analyzed using inductive content analysis. Three study team members independently annotated the transcripts and after discussion agreed on a coding framework,

which was refined as further transcripts were analyzed. Codes were compared and contrasted within and between the transcripts to find the similarities and differences. Categories emerging from analysis were organized into predominant themes.
Results: We purposively sampled 26 participants for maximum variation to take part in 6 focus groups. Six emerging themes were identified around perspectives and experiences with DMARDs ("arthritis medication"). 1) Taking arthritis medications including multiple medications, switching medications, and concerns about medications. 2) Side effects of arthritis medications including fear of side effects and dealing with side effects. 3) The role of healthcare providers including those of the rheumatologist, nurse, and the pharmacist. 4) Facilitators of medication taking including having peer support, education about medications, and patient preferences. 5) Challenges with taking medications including costs and restrictions on life activities. 6) Experiences with the disease including effects on daily life and activities, and perceptions of self with having the disease.
Conclusion: By improving understanding of IA patients' experiences with DMARDs, including both facilitators and barriers of DMARD use, insight will be gained about patients' priorities when taking DMARDs. These findings have implications for informing how patients with IA can be better supported to ensure adherence to DMARDs, by identifying optimal targets for intervention, whether it is removal of a barrier or promotion of a facilitator. Supported by a CIORA grant.

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Medication Adherence in Systemic Lupus Erythematosus: A Systematic Review

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Objectives: The World Health Organization has declared non-adherence to medications an epidemic. Recent data suggests this problem is especially worrisome among patients with systemic lupus erythematosus (SLE). To date, only one systematic review in 2008 has summarized medication adherence to across a variety of rheumatic diseases, including four studies in SLE. To update this data as well as better understand patterns and determinants of adherence in this population, our objective was to a conduct a systematic review of the literature examining medication adherence among patients with SLE.
Methods: We conducted a systematic search of MEDLINE (1946-2014), EMBASE (1974-2014), and WEB OF SCIENCE (1900-2014) databases to identify studies that met the following inclusion criteria: original study, SLE patient population, and evaluation of adherence to disease modifying medications (e.g., antimalarials) as the primary study outcome. We extracted information on: 1) study design, 2) sample size, 3) length of follow-up, 4) data sources (e.g., self-report, clinical records), 5) type of non-adherence problem examined (i. poor execution: scheduled doses are delayed or missed and ii. discontinuation: stopping therapy whether intermittent or permanent), 6) methods used to measure adherence (e.g., Compliance Questionnaire Rheumatology, Medication Event Monitoring System), 7) reported cut-off to dichotomize adherent vs. non-adherent patients (typically $\geq$ 80%) and 8) determinants of adherence reported in multivariable analyses.
Results: After screening 2518 potential articles, 11 met the inclusion criteria. Study sample sizes ranged from 32 to 244 patients and we categorized the studies according to the methods used to measure adherence including self-report (5), electronic monitoring devices (1), clinical records

from rheumatology clinics (3) and refill information from pharmacy records (2). Overall, the percentage of adherent patients ranged from 25% - 57%. Studies also showed that up to 33% of patients discontinue therapy after 5 years. Determinants of non-adherence included depression, beliefs about medications, residence (urban vs. rural), education level, and polypharmacy. **Conclusion:** This is the first systematic review of medication adherence in SLE patients. Adherence rates may vary according to methods used to measure adherence, emphasizing the need for standardized measurement and reporting in future studies. Overall, synthesis of current evidence suggests that the burden of medication non-adherence is substantial in SLE. Findings highlight the importance of developing interventions to support adherence and improve outcomes among patients.

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Risk Factors for Appointment Non-Attendance at an Academic Rheumatology Clinic

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Objectives: Missed clinic appointments reduce the quality, safety and efficiency of care delivery in rheumatology. Electronic reminders have improved attendance in other patient populations. We sought to determine whether clinical or demographic differences existed between non-attenders and attenders, and whether enrollment in our institution's patient portal, MyChart, with electronic reminders was associated with attendance in this population.

Methods: A prospective chart review of consecutive non-attenders to five rheumatologists' clinics at Sunnybrook Health Sciences Centre was conducted between July 1st and December 31st 2014. Clinical and demographic characteristics of non-attenders were retrospectively compared to a convenience sample of 94 patients who attended on 10 randomly selected clinic dates during the same period. Multivariable logistic regression was used to further assess factors that demonstrated significant associations with non-attendance. Patients were encouraged to enroll in MyChart, and an email reminder was implemented for portal users. Clinic attendees were surveyed for their portal enrollment, receipt of the reminder, and satisfaction; 'no-show' occurrences were monitored.

Results: One hundred and ten no-shows took place during the study period (rate 2.5-6.8%). Eighty-six patients (78.2%) were follow-ups, of which 57 (66%) had systemic autoimmune conditions and 41 (47.7%) were taking disease-modifying anti-rheumatic drugs (DMARDs) and/or biologic therapy. Compared to attenders, non-attenders were younger (mean age 55.1 vs 61.2, p=0.021), had a higher prevalence of spondyloarthropathy (22% vs 7.4%, p=0.005), and lower prevalence of rheumatoid arthritis (18.6% vs 39.3%, p=0.002), DMARD or biologic use (47.7% vs 66%, p=0.013), and MyChart enrollment (25.5% vs 46.9%, p=0.002). When multivariable logistic regression was performed, only older age and MyChart enrollment were associated with attendance. New patient referrals comprised 21.8% and 21% of the non-attender and attender populations, respectively. There was no significant difference in age, gender, wait time, distance from the hospital, or referral source (family physician versus specialist) between the groups. The introduction of email reminders for patients enrolled in MyChart has been associated with high patient satisfaction, but has not shown an overall reduction in 'no-shows' at 6 months.

Conclusion: Non-attenders to rheumatology are younger and are less often enrolled in the electronic health portal. Specific strategies to increase health portal enrollment in this target population are needed. Further study to understand new patient 'no-shows' is also warranted.

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Acute Renal Failure and Pulmonary Hemorrhage in a Woman with Dermatomyositis and

Interstitial Lung Disease

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A 41-year-old woman of Jamaican descent presented in 2004 with edema, Raynaud's, mechanic's hands with desquamation of skin on the fingertips, pleuritic chest pain, marked nail-fold capillary changes, elevated CK, and muscle biopsy consistent with dermatomyositis (DM). Her disease was complicated by significant interstitial lung disease. ANA and antibodies to ENA were negative. Treatment included prednisone, azathioprine and cyclophosphamide, and for 6 years she remained stable on tacrolimus and prednisone 10-15mg daily. In 2015 she presented with a 10-day history of general malaise, nausea, and dyspnea. She was hypertensive (BP 140/109), had acute renal failure, and anemia with rare schistocytes. Tacrolimus level was <2. She developed hemoptysis and respiratory failure requiring intubation. Bronchoscopy revealed diffuse alveolar hemorrhage and bronchial washings were positive for influenza B. Renal biopsy showed acute thrombotic microangiopathy (TMA) with cortical infarction, arteriolar thrombosis and fibrinoid necrosis. Serology including ANA/ENA, ANCA, antiphospholipid antibodies and anti-GBM were negative. Tacrolimus was discontinued and she was treated with PLEX, methylprednisolone 1g IV daily and hemodialysis. She recovered from a respiratory standpoint. Hypertension was treated with amlodipine and perindopril. A trial of reducing prednisone resulted in recurrent hemoptysis and mycophenolate was added. She remains stable on dialysis and tapering steroids. Throughout her presentation, her myositis remained quiescent.

Diffuse alveolar hemorrhage and acute renal failure with TMA are both rare occurrences in DM. This is the first report of their co-occurrence in a patient with DM, and the pathophysiology is uncertain.

The patient's presentation resembles the syndrome of accelerated hypertension and renal failure seen in scleroderma renal crisis (SRC), which can rarely be accompanied by pulmonary hemorrhage. Our patient lacks skin tightening and has a negative ANA and ENA. She does have Raynaud's and a patulous esophagus on CT of the chest. She ultimately responded to steroids and mycophenolate but remains dialysis dependent.

Calcineurin inhibitors (CNIs), known to cause nephrotoxicity with TMA in the post-transplant setting, have been implicated as provoking factors in SRC and one case of TMA in DM. However, tacrolimus levels were undetectable on presentation, and this would not account for the patient's recurrent alveolar hemorrhage. Influenza B has been considered a bystander in this patient's presentation.

We present a case of steroid-responsive pulmonary hemorrhage and renal failure with TMA in a patient with DM and CTD-ILD. Clinicians should be aware of its potential occurrence in DM, and further research into its underlying pathophysiology is warranted.

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Corticosteroid Use in Idiopathic Aortitis: A Systematic Review

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Objectives: Background and Objective: Idiopathic aortitis (IA) is a poorly defined entity with no specific pathological or clinical criteria for its classification or diagnosis, except for the presence of aortic inflammation and absence of clinical features of another systemic condition. Most of the present knowledge about IA comes from retrospective series of cases with pathologically identified aortitis. The objective of this systematic review was to clarify available data regarding

outcomes in patients treated with corticosteroids and those without treatment.
Methods: Methods: Data sources: Search strategy using terms "aortitis" and "idiopathic/isolated" identified published articles and abstracts using MEDLINE and EMBASE databases. Study selection: Inclusion criteria required that cases of idiopathic aortitis be confirmed by pathology. Abstracts and case reports were excluded except for abstracts that complemented published manuscripts; reviews were used for triangulation. Authors were contacted for clarifications when required. Data extraction: Data were extracted independently by two reviewers. Our primary goal was to compare outcomes between patients treated with corticosteroids and untreated patients. The primary outcomes included: development of new vascular lesions, clinical complications, delayed diagnosis of other rheumatological diseases and vascular death. Secondary outcomes included preoperative symptoms, ESR/CRP levels and presence of branch vessel disease.
Results: Results: Search yielded 262 records of which 10 fulfilled inclusion criteria. The majority of studies were retrospective. Even the few studies that reported on treatment status described very few events of interest: Miller et al described no new vascular lesions in two treated patients versus one lesion in 19 untreated patients while Clifford et al reported 2 new vascular lesions in 11 treated and 27 in 54 untreated patients. Wang et al reported one new vascular lesion (new aortic aneurysm) in the treated group and none in the untreated patients. Two studies described the need for re-operation, reported in two treated and none of the untreated patients in each of the studies. Finally, Liang et al reported 4 deaths (of unspecified cause) among untreated patients and none in the treated group.
Conclusion: Conclusions / Discussion: Few studies report clinical outcomes in patients diagnosed with idiopathic aortitis treated with corticosteroids. Consequently, there exists a lack of data to guide therapy and long term management of these individuals. The retrospective nature and small cohorts from which data is extracted make it difficult to draw conclusions. Future studies are required to better understand outcomes.

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C-X-C Motif Chemokine 10 and Chemokine (C-X-C Motif) Receptor 3 are Elevated in Synovial Fluid of Psoriatic Arthritis Patients

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Objectives: Psoriatic arthritis (PsA), an immune-mediated musculoskeletal disease, develops in approximately thirty percent of patients with psoriasis. Previously C-X-C motif chemokine 10 (CXCL10) was identified as a predictive biomarker of PsA in patients with psoriasis. This study explores the expression of CXCL10 in synovial fluid (SF) and serum of patients with PsA.
Methods: SF was obtained from patients with PsA, osteoarthritis (OA), rheumatoid arthritis (RA) and gout undergoing routine joint aspirations. RNA was extracted from whole blood and SF cells and CXCL10, CXCR3 and IL-17A mRNA expression was measured by real-time PCR. The protein levels of CXCL10, IL-17A and IFNγ were quantified using a multiplex Luminex assay. Statistical differences were determined by parametric or non-parametric tests for un-paired and paired samples where appropriate ($p<0.05$ was accepted as significant).
Results: Gene expression of CXCL10 in SF cells was 10-fold greater ($p=0.007$) in 40 PsA patients as compared to 14 OA patients and 36.2-fold greater ($p=2.6x10-6$) than in 8 gout patients. CXCR3 gene expression was 5.3-fold greater ($p=0.011$) in PsA patients than in OA

patients, 32.3-fold greater (p=1.2x10-6) than in gout patients, and 3.93-fold greater (p=0.02) than in RA patients. Gene expression of IL-17A was found to be 37.5-fold greater (p=1.5x10-5) in PsA patients than in OA and 19.8-fold greater (p=1.7x10-4) than in gout. Similar results were obtained for protein expression of CXCL10 and IL-17A. No significant differences between PsA and RA patients were found for CXCL10 and IL-17A levels. IFNγ levels were substantially elevated in PsA (median 6.44 pg/ml, interquartile range [IQR] 3.20-14.35 pg/ml) compared to OA SF (median 3.20 pg/ml, IQR 2.83-4.49 pg/ml; p=0.015). In 11 patients with paired SF and serum samples, CXCL10 expression was significantly increased in SF (median 7283.9 pg/ml, IQR 1330-10362 pg/ml) compared to serum (median 282.06; IQR 180.7-395.8 pg/ml; p=0.001) while IFNγ was significantly reduced (SF median 6.03 pg/ml, IQR 4.47-8.94 pg/ml vs. serum median 23.70 pg/ml, IQR 3.2-104.6 pg/ml; p=0.001).

Conclusion: In SF, CXCL10 and IL-17 levels are higher in PsA patients than OA or gout patients and similar to RA patients. Additionally, CXCL10 expression is significantly elevated in SF compared to peripheral circulation of PsA patients. These results indicate that CXCL10 could be an important in the pathogenesis of PsA in an analogous mechanism to RA and may distinguish individuals with PsA from patients with OA and gout.

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In Indigenous North Americans at High Risk for RA Complement C5 Level is Associated with ACPA Positivity and C5a with Transition to Synovitis even after Correcting for in Vitro Complement Activation Found with Prolonged Sample Storage

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Objectives: Complement activation, a key component of innate immunity and activator of adaptive immunity has been linked to RA pathogenesis. Anti-citrullinated peptide antibody (ACPA) and rheumatoid factor (RF) may cause complement activation. We examined the association of the terminal complement component C5 and its breakdown product C5a with ACPA in a preclinical Indigenous North American (INA) population at high risk for severe RA.

Methods: C5, C5a, and ACPA were examined by enzyme-linked immunosorbent assay ELISA, RF by nephlometry, in 267 sera from INA with RA (n=43), first degree relatives (ACPA positive n=16; ACPA negative n=) and FDR who later developed synovitis (FDR-S; n=10). Associations between C5, C5a, ACPA, and subject group were determined using Chi squared, Mann Whitney U tests and Wilcoxon signed ranks tests for paired samples. Correlations were tested by Spearman correlation. Multivariable models controlling for time stored, ACPA, RF, visit sequence and sex were generated to determine the independent influence of ACPA on C5 and C5a serum levels. Data are reported as median (interquartile range (IQR)) and B with 95% confidence limits (CL).

Results: C5a levels increased with time stored (rho=0.69; p<0.0001); C5 levels decreased (rho= -0.33;p=0.002). This presumed in vitro activation was most important for samples stored over 5 years. Comparing all FDR samples, C5 levels were higher in ACPA positive vs ACPA negative samples (135.2 (46.6) vs 71.2 (75) µg/ml; p<0.001). Using linear regression to determine predictors of C5 levels in 153 samples from 80 FDR, ACPA positivity independently predicted higher C5 level (B (CL) 42 (17-71)) after correcting for duration of time sample stored, visit sequence, sex and RF. In FDR-S (n=10), ACPA titers increased prior to synovitis. FDR-S had higher C5a levels than FDR (238 (225) vs 133 (362) ng/ml; p<0.0001) an association that was

significant after correcting for duration of storage, visit sequence, ACPA, RF and sex (B=95(16-174); p=0.02).
Conclusion: In vitro complement activation may occur with prolonged sample storage and must be considered in any analysis of stored samples. C5 level is independently predicted by ACPA in FDR in an INA prospective cohort suggesting decreased activity of the terminal complement cascade in the presence of ACPA. Those who transitioned to synovitis showed evidence of increased complement activity and prior to onset of synovitis showed expansion of ACPA. ACPA related complement cascade activation in imminent synovitis cannot be confirmed based on this data.

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Development of Neoplasms in Pediatric Patients with Rheumatic Disease Exposed to Biologic Agents: A Retrospective Single-Centre Study

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Objectives: Biologic agents are effective in the management of pediatric rheumatic diseases. However, they may be associated with adverse effects including increased risk of malignancy as reported by the FDA in 2010 in regards to children treated with anti-TNF agents. The aim of this study was to determine the frequency and characteristics of pediatric neoplasms following biologic treatment in children with rheumatic diseases at a single centre.
Methods: A retrospective study was performed on children who developed neoplasms after initiating biologic therapy for rheumatic disease from January 1997 to August 2013 at The Hospital for Sick Children (SickKids). Patients were identified from the SickKids rheumatology biologic registry. Data collected included neoplastic data, clinical data and medication history.
Results: 354 patients with childhood rheumatic diseases who received one or more biologic agents from January 1997 to August 2013 were identified. Juvenile idiopathic arthritis (JIA) was the most common diagnosis (83%). A total of 6 patients (1.7%) developed neoplasm: 4 JIA, 1 idiopathic uveitis, 1 polyarteritis nodosa. The neoplasms consisted of five solid organ tumours (2 renal carcinoma, sarcoma, nasopharyngeal carcinoma, pilomatricoma) and one hepatic T-cell lymphoma. The neoplasms were all malignant except for one patient with a benign skin tumour. The mean time to neoplasm development from rheumatologic diagnosis was 12.7 years. The mean time to neoplasm development from initiation of anti-TNFα therapy was 5.65 years. In patients with neoplasms, they had on average been exposed to 3 DMARDS and 1.5 biologic agents. Sub-analysis in the JIA population revealed 86% predicted probability of being neoplasm free at 16.7 years post initiation of biologic agents.
Conclusion: The neoplasms were of uncommon morphology and aggressive in nature. Neoplasms developed late after drug exposure. The vast majority of patients did not develop neoplasms. Biologic agents and DMARDS are effective for the management of rheumatic disease but routine neoplasm/malignancy surveillance should be part of clinical care.

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Can Oral and Parenteral Steroid in the First Three Months Modify Disease Course in Early RA? Results from the Canadian Early RA Cohort (CATCH)

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Objectives: Steroids in early RA can rapidly inhibit pro-inflammatory cytokines allowing slower-acting DMARDs time to reduce disease activity. Steroid use in early RA is variable, though several reports have suggested that combining low dose oral steroids with DMARDS can reduce erosions. We examined whether steroid use and administration route in the first 3 months was associated with progression to biologic therapies at 12 and 18 months in the Canadian Early Arthritis Cohort (CATCH).

Methods: Data are from the first 18 months of patients entering CATCH and included participants with symptoms ≤13 months who fulfilled ACR 1987 and/or 2010 RA criteria, were not on biologics in the first 3 months, and had complete information available on biologic, steroid, and methotrexate (MTX) use. Patients were stratified based on steroid use (none, IA/IM, oral, or IA/IM+oral) within first 3 months. We used t-tests to compare baseline characteristics (any steroids vs. none) and multiple logistic regression to determine the odds of being on biologics at 12 and 18 months by early steroid use, controlling for patient (age, sex, education, comorbidities), RA (symptom duration, MTX use at baseline and 3 months), and site (enrolling>100 patients) characteristics.

Results: At baseline (N=1481), the 877 (59%) of patients receiving steroids were significantly ($p<.05$) older, unemployed, had more comorbidities, shorter symptom duration, and were from larger sites, but did not differ statistically by sex, race, BMI, or education. Steroid users had significantly higher mean scores for patient-reported (patient global, pain, fatigue, HAQ) and clinical (MD global, joint counts, DAS28 and CDAI) characteristics. At 12 and 18 months, 126 (9%) and 159 (12%) were on biologics, respectively. Patients receiving steroids had significantly greater odds of being on biologics at 12 (OR [95%CI] for IA/IM 2.3 [1.3, 4.1]; oral 2.6 [1.5, 4.4]; both 7.9 [4.2, 14.7]) and 18 months (IA/IM 1.6 [1.0, 2.7]; oral 2.0 [1.3, 3.2]; both 3.9 [2.2, 6.9], after controlling for age, sex, education, baseline CDAI, comorbidities, symptom duration, MTX use, and site size.

Conclusion: Patients receiving steroids within the first 3 months were older, had more active RA, and shorter symptom duration. Despite use of parenteral and oral steroids, they were more likely to require biologics at both 12 and 18 months. Thus, while steroids may improve symptoms in the short and medium term, results suggest they may not modify long term disease course in early RA.

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Self-Management of RA Flares Varies by Severity and Duration: Results from CATCH

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Objectives: Early rheumatoid arthritis (ERA) patients attending office visits often report being in a disease flares. We evaluated patient reports of flare in relation to disease activity and self-management behaviors (SM) in a large Canadian ERA observational study (CATCH).
Methods: At each visit, patients provided ratings of flare severity (10 point VAS), duration, symptoms, functional impacts and SM. Joint counts were recorded, and CDAI scores were calculated. A checklist of SM strategies was developed based on international qualitative studies by the OMERACT RA Flare Group.
Results: The 474/1983 (24%) who reported being in flare were mostly female (76%), white (78%) and educated (53%>high school), with a mean (SD) age of 53 (14) yrs and symptom duration of 38 (25) months. Mean (SD) flare severity was 5.4/10 (2.4) and 67% reported duration > 7 days; flaring patients had significantly higher mean levels of pain, fatigue, stiffness, disability, reduced participation, and difficulty coping. SM did not differ by sex and included using analgesics (50%) and steroids (13%); reducing (45%) and avoiding (28%) activities; selected behaviors (massage, heat/cold, exercise); 17% called their rheumatologist for help. Use of SM increased with flare severity for all activities except selected behaviors and steroid use ($p<.005$); trends were evident with flare duration and use of analgesics ($p=.08$), avoiding activities ($p=.09$) and calling the rheumatologist ($p=.001$). Recently diagnosed patients (0-12 months) were significantly more likely to report using SM compared to those with RA>12 months (79% vs. 66%; $p=.015$) mostly using massage, heat and exercise (40% vs 28%, $p=.04$). As compared to those not on biologics, more patients on biologics reduced or avoided activities (43% vs 60%, $p =.016$; 25% vs 44%, $p = .004$). Among those with flare severity ≥ 4 and duration >7d, 80% reported SM including analgesics (57%), reducing activities (46%), behaviors (40%), avoiding activities (34%), or calling MD (19%).
Conclusion: Patient reports of RA flare are reliably associated with patient and clinical indicators of higher disease activity. Self-management is common, and increases with flare severity and duration. SM includes limiting participation/role activities and using additional medications and behaviors to reduce symptoms and impacts. Self-management appears to be initiated early into flares and highlight their substantial impact on quality of life.

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Early Experience with Tofacitinib in Canada: Rheumatoid Arthritis (RA) Patient Characteristics and Treatment Patterns

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Objectives: Tofacitinib is an oral Janus kinase (JAK) inhibitor approved in Canada for the treatment of adult patients with moderately to severely active Rheumatoid Arthritis (RA) who have had an inadequate response to methotrexate (MTX).1 The objective of this study is to provide characterization of RA patients newly prescribed tofacitinib 5mg bid in Canada and treatment patterns for tofacitinib use in the first year after Health Canada approval (April 17, 2014).
Methods: A descriptive analysis of patient-reported demographic and medication history was performed for RA patients newly prescribed tofacitinib and enrolled in the Canadian eXel customer support program. eXel is designed to provide support to physicians and patients

through facilitating access and providing patient education during treatment with tofacitinib.
Results: Between June 1, 2014-August 31, 2015, 1171 RA patients were newly prescribed tofacitinib and enrolled in the eXel customer support program. As of August 31, 2015, 893 (76.3 %) patients were actively receiving therapy, 50 (4.3 %) were in the process of initiating therapy, 157 (13.4 %) were no longer active in the program following treatment initiation and 71 (6.1 %) did not initiate therapy. Based upon patient-reported information, the mean age at baseline was 58 years, the majority of patients were female (80.3 %) and the mean disease duration was 15 years. The majority of tofacitinib patients were residing in Ontario (39.0 %), Quebec (18.9 %), Alberta (12.9 %) and Nova Scotia (9.8 %) with 19.4 % from the remaining provinces of Western and Atlantic Canada. Out of 949 patients with available medication history, 189 (19.9 %) were biologic-naïve. Of the 760 (80.1 %) patients who had received ≥1 prior biologic, the mean number of prior biologics was 2.4.
Conclusion: Among Canadian RA patients newly prescribed tofacitinib, most reported receiving a prior biologic and had long-standing disease. Prescribing was not limited to this population with approximately 20% of biologic-naïve patients. During the early period following FDA approval (November 6, 2012-March 1, 2014), data from a US-based cohort, Corrona, revealed that tofacitinib is commonly initiated in RA patients with long-standing disease and experience with multiple prior biologic treatments.2 Ongoing observation and characterization of patients prescribed tofacitinib is required to understand drug utilization in Canada for a first-in-class DMARD for the treatment of RA. 1. Xeljanz (tofacitinib) Product Monograph, Pfizer Canada, April 17, 2014 2. Kavanaugh A et al Arthritis Rheum 2014;66(11):S677

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Study Completion and Etanercept Retention in Patients with Rheumatoid Arthritis Treated with Etanercept or Etanercept and Methotrexate in the CAnadian Methotrexate and Etanercept Outcome (CAMEO) Study

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Objectives: In the CAnadian Methotrexate and Etanercept Outcome (CAMEO) study, rheumatoid arthritis (RA) patients with low disease activity (LDA) after 6 months of etanercept (ETN) + methotrexate (MTX) treatment who continued ETN+MTX or switched to ETN monotherapy at month 6 (M6) had similar outcomes at 12 months. Conversely, switching to monotherapy without achieving LDA at M6 reduced response. The objective was to assess the different treatment group discontinuation rates and association between ETN discontinuation and disease activity.
Methods: Patients were anti-TNF naïve with active RA (≥3 swollen joints, disease activity score [DAS28] ≥3.2), despite MTX treatment (≥15 mg/week; 10 mg/week if intolerant) for >12 weeks. Following 6 months of ETN (50 mg/week subcutaneously) + MTX, patients were randomized (1:1) to ETN+MTX or ETN for 18 months. ETN retention was assessed using prescribing information at study end. Cox regression analysis determined associations of study completion and ETN retention with DAS28 at M6 (continuous variable; not dichotomized to LDA and moderate/high disease activity), reimbursement, and demographics.
Results: Of the 258 enrolled patients (76% female, mean age 54.7±12.5 years, disease duration 8.9±8.4 years, baseline DAS28 5.4±1.1), 205 (79%) were randomized at M6 (98 ETN, 107

ETN+MTX). Of those randomized, 50 (51.0%) and 75 (70.1%) on ETN and ETN+MTX completed the study at M24, respectively, with the rest discontinuing due to adverse events, lack of efficacy, or other reasons. Patients on ETN alone were twice as likely to discontinue <M24 as those on ETN+MTX (HR [95% CI] 2.0 [1.2, 3.1], p=0.004), and chance of discontinuing increased by 20% with increasing DAS28 at M6 in both groups (HR [95% CI] 1.2 [1.1, 1.5], p=0.005). Of those randomized, 80 (81.6%) and 80 (74.8%) on ETN and ETN+MTX continued ETN at study end, respectively, but some on ETN alone restarted MTX. ETN retention did not differ between treatment groups (HR [95% CI] 0.8 [0.4, 1.5], p=0.5), but chance of discontinuing ETN increased with higher DAS28 at M6 in both groups (HR [95% CI] 1.4 [1.1, 1.8], p=0.0017).

Conclusion: Chance of study completion and continuing ETN increased with lower disease activity at M6. Patients on ETN+MTX versus ETN, and those achieving LDA at M6 in either group, were more likely to complete the study. Both treatment groups had high ETN retention rates at study end, but those on ETN monotherapy were less apt to continue their per protocol treatment allocation. Those achieving LDA at M6 being more likely to remain on ETN.

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Treatment Patterns in Rheumatoid Arthritis after Methotrexate: Data from the Ontario Best Practice Research Initiatives Cohort

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Objectives: Guidelines support the use of combination conventional synthetic Disease-Modifying Antirheumatic Drugs (csDMARDs), switching csDMARDs and/or use of biologic DMARDs (bDMARDs) treatment in active rheumatoid arthritis (RA) after use of methotrexate (MTX). The purpose of this study was to determine treatment practices after use of MTX in patients with RA who were on either monotherapy or combination csDMARDs in a large observational cohort; the Ontario Best Practices Research Initiative (OBRI) in order to determine contemporary practice where use of bDMARDs from government coverage is restricted to active RA (+RF and/or +ACPA) or erosions, SJC>5 with MTX failure, combination failure (triple csDMARDs: MTX + hydroxychloroquine + sulfasalazine) or use of leflunomide.

Methods: Patients enrolled in OBRI with documented MTX failure defined as discontinuation due to side effect, primary / secondary failure, or patient / physician decision. Demographics and disease parameters at MTX failure were compared between monotherapy failures, double therapy (Rx) failures, and triple Rx failures.

Results: A total of 313 patients with MTX failure were included with a mean (SD) age of 58.8 (13.2) years and disease duration of 6.7 (8.2) years. Of these, 102 (32.6%) were on MTX monotherapy, 156 (49.8%) were double (MTX +1 csDMARD) Rx, and 55 (17.6%) were on triple or more (MTX + multiple csDMARDs) Rx, respectively, at the time of MTX failure. At the time of MTX failure disease duration was numerically higher in patients failing monotherapy and double Rx as compared to triple Rx (7.5 vs. 6.8 vs. 4.5 years, respectively; P=0.276) while patients failing triple Rx were more likely to have an erosion (43.1% vs. 37.2% vs. 61.8%; P=0.009) and had significantly higher patient global (3.5 vs. 3.9 vs. 4.8; P=0.046). When looking at patient transition to csDMARDs monotherapy, csDMARDs combination Rx or bDMARDs

treatment, patients receiving monotherapy were more apt to have switches to other monotherapy (87% of patients), whereas those on combination Rx received more combination csDMARDs (78% and 74% of patients on MTX + 1 csDMARDs or MTX + multiple csDMARDs, respectively) and bDMARDs combination Rx (21% and 26%, respectively).
Conclusion: There are inherent differences in the selection of subsequent treatment regimen between patients failing MTX monotherapy vs. MTX combination therapy. Overall, the results of the current analysis suggest the use of a sequential treatment intensification strategy in routine clinical practice in Ontario.

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Predictors of Real-World Treatment Sustainability in RA Patients Treated with Abatacept Infusion in Canada Implications for Routine Care

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Objectives: Treatment retention reflects a drug's effectiveness encompassing efficacy, safety, and compliance. There may be differences in long-term sustainability between different biologics used in rheumatoid arthritis (RA). This analysis assessed real-world retention rates of abatacept infusion in RA patients and evaluated the determinants of treatment sustainability.
Methods: RA patients administered abatacept in routine practice via the Orencia Response Program network, between August 2006 and September 2015, with ≥1 follow-up evaluations, were included. Treatment sustainability was assessed with the Kaplan-Meier (KM) estimator of the survival function. Parameters associated with treatment sustainability were assessed using the Cox proportional-hazard model. Potential predictors considered were: the number of previous biologics, monotherapy vs. combination therapy, home vs. clinic infusion, age, sex, severity of disease, presence of comorbidity, and years since diagnosis. The impact of these parameters on HAQ was assessed with mixed models with repeated measures.
Results: A total of 4767 patients were included with a mean (SD) age of 60.6 (14.3) years and disease duration of 17.3 (11.6) years. The majority (80%) were females and 1354 (28.4%) were biologic naïve. Compared to patients previously on a biologic, biologic naïve patients were older (62.1±14.2 vs 60.0±14.2, $p<0.001$), with a shorter disease duration (13.7±11.1 vs 18.8 ±11.5, $p<0.001$), higher baseline MTX use (49% vs 43.7%, $p<0.0009$) and lower baseline Health Assessment Questionnaire (HAQ) score (1.48 vs 1.66, $p<0.0001$). Therapy was discontinued in 2917 (61.2%) patients, for which mean (SD) treatment duration was 22.03 (19.27) months. Significant differences in abatacept retention were observed when comparing biologic naïve patients to those who failed one and ≥2 biologics ($p<0.0001$). Previous biologics use was associated with poorer retention probability [HR 1 vs. 0 (95% CI): 1.321 (1.193-1.462, $p<0.001$; HR ≥2 vs. 0 (95% CI): 1.402 (1.273-1.544), $p<0.001$], whereas longer disease duration was associated with better retention [HR 0.992 (95% CI 0.989-0.995, $p<0.001$). Neither the concomitant use of MTX nor the location of infusions (home vs clinic) were predictive of abatacept retention. Lower age, higher baseline HAQ, shorter disease duration, male gender, and the absence of comorbidity were factors identified as significant predictors of better functional outcome as measured by HAQ.
Conclusion: This large real-world analysis identified the use of previous biologics and disease duration as independent predictors of abatacept sustainability. Also, various patient- and disease-related characteristics were associated with differences in function as measured by HAQ.

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Ophthalmoplegia - An Unusual Presentation of GCA

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An 87-year-old woman reported a 2-week history of progressive left-sided ptosis, diplopia, and left-sided scalp tenderness. She endorsed jaw claudication but denied any constitutional symptoms. Her symptoms developed within days of a fall from a step-ladder where she sustained a minor head injury with no loss of consciousness. She was seen in her local emergency room and had a plain CT head that was remarkable only for a left subgaleal hematoma. On examination by her optometrist 2-weeks later she was found to have left-sided ptosis and was referred for further evaluation.

Visual acuity was normal (corrected by eye glasses). Confrontation visual fields revealed a nasal field defect of her left eye, and testing of the right eye was unremarkable. There was no relative afferent pupillary defect. Fundoscopic examination revealed normal optic disc. There was a pupil-involving left third nerve palsy with limited adduction, elevation, complete ptosis, and pupil dilation with minimal reaction. She also had restricted left eye abduction, suggesting cranial nerve six palsy. Saccades and pursuit were normal.

Brain MRI and MRA showed an incidental 1.3 mm left MCA bifurcation aneurysm. ESR was 30 mm/h and CRP was 10.4 mg/L. Ultrasound of the temporal arteries revealed a left temporal artery halo sign.

She was treated with oral prednisone 50 mg daily and underwent temporal artery biopsy. This showed histological features consistent with giant cell arteritis (GCA) . In follow up 3 weeks after presentation, the ptosis, extraocular movements, and pupil were significantly improved following high dose oral corticosteroid treatment.

Ophthalmoplegia is an uncommon manifestation of GCA. It can be can due to a vasculitis of the lateral and medial branches of the ophthalmic artery which supply the extraocular muscles. Involvement of the anterior and posterior cerebral circulations[1) can directly damage the cranial nerves . The most commonly involved is the third cranial nerve. Post ganglionic Horner syndrome is one of the rarer manifestations of ocular involvement in GCA. It can be due to inflammatory lesions of the internal carotid artery damaging the sympathetic nerve fibers [2]. Other ocular manifestations include anterior ischemic optic neuritis(AION) central retinal artery occlusion and posterior ischemic optic neuritis.

1.Hendrix P, et al. Arterial supply of the upper cranial nerves: a comprehensive review. Clin Anat. 2014 Nov;27(8):1159-66.

2. Bromfield EB, Slakter JS. Horner's syndrome in temporal arteritis. Arch Neurol 1988; 45: 604.

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Primary and Secondary Non-Response in RA Patients Treated with an Anti-TNF: An Analysis from a Prospective, Observational Registry

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Lehman (Janssen Inc., Toronto); Francois Nantel (Janssen Inc., Toronto); Brendan Osborne (Janssen Inc., Toronto); Cathy Tkaczyk (Janssen Inc., Toronto); Karina Maslova (Janssen Inc., Toronto)
Objectives: Despite the well documented effectiveness of anti-TNF treatment (Tx) in rheumatoid arthritis (RA), some patients can be refractory to treatment (primary [1ry] failure) or may lose responsiveness (secondary [2ry] failure). In such cases, switching to another anti-TNF or a different biologic class can often restore therapeutic response. The aim of this analysis was to assess the rate of non-response among RA patients treated with anti-TNFs in Canadian routine clinical practice.
Methods: BioTRAC is an ongoing, prospective registry of patients initiating treatment for RA, ankylosing spondylitis, or psoriatic arthritis with infliximab (IFX) or golimumab (GLM). RA patients treated with IFX since 2002 or with GLM since 2010 who had at least one post-baseline assessment were eligible. Patients with available information on DAS28 or EULAR response in at least one post-baseline visit were included in the respective analyses.
Results: 1,127 patients (75.6% female) were included with mean (SD) age of 56.1 (13.4) years and disease duration of 8.4 (8.9) years at baseline. The majority were biologic naïve (93.2%), treated with IFX (76.0%), and received a concomitant DMARD (86.2%) at baseline. Mean (SD) disease parameters at baseline were: CDAI: 33.9 (17.6); HAQ: 1.6 (0.7); SJC: 9.8 (6.8); TJC: 11.5 (8.0). After a mean (SD) follow-up of 35.5 (36.8) mos, 7 (67.8%) patients were discontinued overall and 226 (20.1%) due to effectiveness reasons (lack of response: n=67; loss of response: n=83; disease progression: n=76). Among the patients discontinued due to effectiveness reasons, the majority were discontinued after 12 months (54.4%) and had achieved prior good EULAR response (66.2%). Among patients discontinued due to lack of response, 17.7% and 45.5% had previously achieved DAS28 low disease activity (LDA) and good EULAR response, respectively; whereas, among patients discontinued due to loss of response, 46.9% and 76.8% had a previously documented achievement of the two targets, respectively.
Conclusion: The results of this analysis have shown a low rate of failure during treatment with IFX and GLM. Non achievement of DAS28 LDA was a good predictor of lack of response and more predictive than good EULAR response; non-achievement of good EULAR response, on the other hand, was a better predictor of loss of response. Overall, significant variation exists depending on each investigator's definition of 1ry and 2ry failure, which highlights the importance of establishing standardized definitions of these terms.
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Safety and Efficacy of Biologic Treatments in Autoinflammatory Diseases (AID)
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Objectives: Conventional treatments for autoinflammatory diseases (AID) include NSAIDs and corticosteroids, however, some patients fail these initial therapies. Biologic response modifiers ("biologics") target the cytokine pathways underlying many AIDs, and may be equally, or more effective than conventional treatments. We conducted a literature review to assess the safety and efficacy of biologics for AIDs.
Methods: A MEDLINE and EMBASE literature search up to July 2015 was conducted for each AID individually. The Boolean search consisted of all known common names for the disease along with biologic treatments. Articles were read and applicable case reports and trials were categorized based on criteria. Patients were categorized as having a good, moderate or poor response based on remission state (clinical remission, partial remission or no response).

Results: For Familial Mediterranean Fever (FMF) 44 articles (190 patients) were reviewed and anti-interleukin-1 (IL-1) drugs were the biologics of choice, with a good response in 82%, moderate response in 1% and no response in 17%. For Cryopyrin Associated Periodic Syndrome (CAPS) 68 articles (393 patients) were reviewed and anti-IL-1 drugs demonstrated a good response in 92%, moderate response in 7% and no response in 1%. For Tumor Necrosis Factor Receptor Associated Periodic Syndrome (TRAPS) 27 articles (99 patients) were reviewed and tumor necrosis factor alpha inhibitors (anti-TNF) were the biologics of choice, with a good response in 77%, moderate response in 4% and no response in 19%. For Chronic Recurrent Multifocal Osteomyelitis (CRMO) 28 articles (290 patients) were reviewed and anti-TNF drugs demonstrated a good response in 53%, moderate response in 31% and no response in 16%. Limited number of studies for Majeed Syndrome (2 articles, 3 patients) and Deficiency of Interleukin-1 Receptor Antagonist (DIRA) (8 articles, 17 patients) have examined biologics, with a clear preference for anti-IL-1 drugs with a good response in 100%. This contrasts to Adenosine Deaminase 2 Deficiency (DADA2) (7 articles, 42 patients) where the preferred biologic is anti-TNF, with a good response in 92%. Pyogenic Arthritis Pyoderma Gangrenosum and Acne (PAPA) (17 articles, 29 patients) demonstrates a good response to either anti-IL-1 (58%) or anti-TNF (55%) biologics. Few side effects were reported for either biologic class for any AID, the most common being injection site reaction.
Conclusion: Recent literature confirms that anti-IL-1 and anti-TNF biologics are effective in the treatment of AIDs, as they target mediating pathways of these diseases. Biologics should be considered in the therapeutic regimen for AIDs.

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The Relationship between Disease Activity and Lipid Levels in Early Inflammatory Arthritis Patients

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Objectives: Rheumatoid arthritis (RA) has been associated with higher rates of cardiovascular disease and morbidity. Interestingly, there exists a documented "lipid paradox" in RA whereby disease activity is correlated with lower levels of traditionally pathogenic lipid levels (particularly LDL) – regardless of increased cardiovascular risk. There is also evidence that disease activity may modulate atheroprotective effects of HDL cholesterol. We wanted to explore the effect of disease activity on lipid levels in a cohort of Early Arthritis patients over their disease course.
Methods: 278 patients with early inflammatory arthritis (EIA) were assessed annually for their lipid values (HDL, LDL, total cholesterol, and triglycerides) and disease activity reported as composite indices (DAS28-ESR(3variable), DAS28-CRP(3variable)). Arthritis treatment response was defined by EULAR criteria and disease remission was defined as DAS28-ESR(3variable) <2.6. Correlations between disease activity and lipid levels were assessed using Spearman's rho. Lipid levels in individuals seropositive or seronegative for rheumatoid factor (RF) and anti-CCP antibody were compared using Mann-Whitney U tests.
Results: 75% of the patient cohort was female, with a mean age of 54 (SD 15) and % meeting ACR criteria for RA. 65% were RF positive and 42% were anti-CCP positive. Baseline disease activity was moderate (mean DAS28-ESR(3variable) of 4.26 (SD 1.50)). A median of 6 serial lipid values were collected for each patient. There was modest negative correlation between disease activity and HDL levels for both DAS28-ESR(3variable) (-0.129, p=0.00) and DAS28-CRP(3variable) (-0.170 p=0.00), a trend for a negative correlation with total Cholesterol levels

(-0.062, p=0.39 and -0.108, p=0.00, respectively), but no correlation between LDL and triglyceride levels and disease activity. A good or moderate treatment response was achieved by 183/267 (70%) by the last visit. Although there was no correlation between change in DAS28-ESR(3variable) and change in lipid levels over follow-up, there was a trend for higher LDL levels in those achieving better treatment responses (LDL +0.07 (SD 0.70) in no response, +0.18 (SD 0.66) in good response, Kruskal Wallis p=0.07). However, the other lipids did not feature any significant change.

Conclusion: Disease activity in our EIA cohort seems to correlate with lower HDL levels – however there is little correlation with other lipids. This is concordant with emerging evidence that RA disease activity may modify atheroprotective function of HDL cholesterol – perhaps contributing to the increased cardiovascular disease with RA. Consistent with the "lipid paradox" - LDL levels showed significant decrease over time in our cohort as patients received management.

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Spontaneous Renal Artery Dissection (SRAD) as a Mimicker of Vasculitis in a Case of Multiple Bilateral Renal Infarcts

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Spontaneous bilateral renal artery dissection is a rare condition, with less than 50 documented cases in the literature. If unrecognized, it can progress to renal infarction with subsequent insufficiency. It presents a diagnostic challenge because of its non-specific presentation requiring extensive workup.

We describe a previously healthy 41-year old male presenting hypertensive with right flank pain and fevers. After workup yielded leukocytosis, mildly elevated creatinine, and CT evidence of perinephric stranding, he was initially unsuccessfully treated for pyelonephritis. Subsequent CT angiography identified bilateral renal artery stenosis and celiac artery dissection concerning for a vasculitic process, along with multiple areas of hemorrhagic renal infarctions. A renal biopsy revealed patchy cortical necrosis without any evidence of small or medium vessel vasculitis or thrombotic microangiopathy. A diagnosis of polyarteritis nodosa (PAN) was considered, but he presented with only slight elevation of his inflammatory markers, which decreased spontaneously without immunosuppression. He did not have any symptoms or signs typical of PAN nor any imaging findings consistent with the disease. Antiphospholipid antibodies were measured given the multiple infarcts and previous case reports of bilateral renal artery stenosis associated with the syndrome, revealing a slightly elevated lupus anticoagulant level. We decided to anticoagulate the patient given the positive lupus anticoagulant and risk of further thrombosis due to turbulent flow in the stenotic renal arteries. At discharge, he had complete resolution of flank pain and a repeat lupus inhibitor level (while on warfarin) was negative. A follow-up conventional angiogram was performed to better visualize the distal renal arteries and look for further signs of vasculitis or fibromuscular dysplasia. It clearly showed bilateral renal artery and celiac artery dissections without stenoses, characteristic of an entity known as spontaneous renal artery dissection (SRAD). Subsequent genetics consultation was sought, which ruled out connective tissue disorders such as Ehlers Danlos Syndrome. After three months of anticoagulation, the patient was switched to lifelong aspirin therapy with close vascular surgery and nephrology follow-up.

This case highlights the diagnostic difficulty presented by spontaneous renal artery dissection, and the extensive imaging and immune workup required to establish an etiology for it. It is

important to consider this condition as a mimicker of vasculitis, and a rare cause of flank pain and renal infarcts in otherwise healthy young patients.

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High-Resolution Peripheral Quantitative Computed Tomography (HR-pQCT) Imaging in the Assessment of Periarticular Bone of Metacarpophalangeal and Wrist Joints

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Objectives: To synthesize descriptions of periarticular findings at the metacarpophalangeal (MCP) and wrist joints in different types of arthritis and in the normal state imaged by high-resolution peripheral quantitative computed tomography (HR-pQCT); to assemble the literature reporting on the ability of HR-pQCT to detect findings relative to other imaging modalities; and to collate results on the reproducibility of image interpretation.

Methods: A systematic literature review was performed using terms for HR-pQCT and the metacarpophalangeal joints (MCPs) or wrist joints using medical literature databases and conference abstracts. Any study describing pre-defined pathology findings, comparison to another radiographic technique, or a measure of reproducibility was included with no limitation by disease state.

Results: We identified 44 studies meeting inclusion criteria from the 1,901 articles identified by our search. All 44 reported on pathology findings, including erosions (n=31), bone microarchitecture (n=10) and bone mineral density (n=10) parameters, joint space evaluation (n=7) or osteophyte characterization (n=7). Seventeen of the studies compared HR-pQCT findings to other imaging modalities including plain radiography (n=9), ultrasound (n=4), magnetic resonance imaging (n=5) or micro-computed tomography (n=2), with HR-pQCT having high sensitivity for erosion detection. Twenty-four studies included an assessment of reproducibility with good-excellent metrics, and highlighting the critical importance of positioning when assessing joint space parameters.

Conclusion: Despite high sensitivity for erosion detection and good reproducibility, more research is required to determine where HR-pQCT can be applied to enhance our understanding of periarticular bone changes in a variety of arthritis conditions.

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Improving Methotrexate Medication Documentation in Juvenile Idiopathic Arthritis

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Objectives: Background and project rationale: Medication compliance and side effect monitoring are important components of clinical care in order to give the best chance at disease remission. Without proper documentation, we do not know if these aspects of medication management are being discussed in a consistent manner. Methotrexate is a medication that is widely used to treat patients with Juvenile Idiopathic Arthritis (JIA) and is known to have side effects, which could reduce adherence. While these discussions occur, they are not always documented in the health record. If we documented these discussions appropriately, we would ensure they were occurring at every visit. Aim: Improve documentation of methotrexate side effects (i.e. nausea, vomiting, oral ulcers, hair loss, screening blood work), compliance, and long-term counseling (i.e. pregnancy, alcohol and smoking avoidance, and vaccine safety) in

patients with JIA by 20% by May 30, 2015.
Methods: An audit of all general rheumatology clinic visits that took place during one week in May 2014 was conducted. Medical records, including hand written clinic notes and the accompanying dictated letters were reviewed. Patient diagnoses and medications were identified.
Results: The initial audit identified 9 patients who had JIA treated with methotrexate. Medication adherence was documented in 6 (67%) patients. Presence or absence of side effects was listed in 4 (44%) patients. Long-term counselling was not documented for any patient. New clinic forms were being developed in the interim to enhance documentation. A second audit was completed from one week of clinics in January 2015 after the forms had been in use for two months. 15 patients were reviewed with JIA treated with methotrexate. Compliance was documented in 14 (93%), side effects in 13 (87%), and long-term counselling in 2 (13%) patients.
Conclusion: Lessons learned: New form improved documentation of medication compliance and side effects to meet our target. However, documentation of long-term counselling needs to be improved. Next steps: Areas for documentation of long-term medication counseling are provided on the forms, but are on the last page and not often completed. Education of all team members around appropriate medication counseling (frequency and content) and documentation of counseling during clinic visits will be implemented in the next PDSA cycle.

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Describing Enthesitis in the ReACCh-Out Cohort

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Objectives: Enthesitis is a feature of juvenile idiopathic arthritis (JIA) that has been recognized for many years, but to date not well described in large prospective cohorts. Therefore, we describe the overall prevalence, patterns of involvement and characteristics associated with enthesitis in the Research in Arthritis in Canadian Children, Emphasizing Outcomes (ReACCh-Out) cohort.
Methods: The ReACCh-Out cohort is a prospective multi-centre inception cohort of 1492 patients with JIA with a total of 14,346 patient visits over up to 5 years of follow-up (recruited between 2005 and 2010). The presence and location of enthesitis was recorded systematically by paediatric rheumatologists in all children in the cohort at 0, 6, 12, 18, 24, 36, 48 and 60 months after enrolment. At clinic visits in between these times a total count of body sites with enthesitis was reported. Enthesitis was defined for this analysis as present on >1 occasion and/or at >1 body site. Descriptive statistics were used to determine the prevalence of enthesitis, most frequent sites of involvement, and the characteristics associated with enthesitis.
Results: Enthesitis was reported in 227 (15%) patients during a median follow up of 33 months (range 18-49 months). Based on data available within six months of recruitment, 150 of these 227 subjects (66%) were classified as having enthesitis-related arthritis, 19% as having psoriatic or undifferentiated arthritis and 15% as having other JIA categories. The most frequent sites of involvement were the calcaneal plantar insertion (38% of children with enthesitis), the Achilles' insertion (32%), and the tibial tuberosity (30%). The mean age at onset of JIA was 10.9 (SD 3.2) years for those with enthesitis and 7.7 (SD 4.7) years for those without enthesitis; 57% of those with enthesitis and 32% without enthesitis were male. ANA positivity was reported in 25% and 49% (of those tested) and HLA B27 positivity in 42% and 14% (of those tested),

respectively. Five or more joints were reported at least at one visit in 57% and 40% respectively. Sacroiliitis (defined clinically) was reported in 30% and 4%, respectively.
Conclusion: Enthesitis was reported in 15% of the JIA patients in the ReACCh-Out cohort (most commonly in patients with ERA). The most frequent sites of involvement were at the calcaneus, Achilles' insertions, and tibial tuberosities. The characteristics associated with enthesitis were broadly as expected, except that over half the patients with enthesitis had 5 or more active joints in at least one visit.

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Duration of Bisphosphonate Therapy and the Risk of Atypical Femur Fracture in Rheumatic Disease Patients

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Objectives: Long-term bisphosphonate (BP) use is associated with increased risk of atypical femur fracture (AFF). Experts recommend that patients switch anti-osteoporosis therapy after 5 years to minimize AFF incidence. If duration of BP use is known, it may be possible to prevent AFFs in the rheumatic disease patient population. Change of anti-osteoporosis medication could also be initiated in a timely manner. Therefore, adequate documentation of BP use is necessary to decrease adverse events. The objective of this study is to determine the duration of BP therapy in 100 patients at an academic rheumatology practice. It is hypothesized that a significant number of patients will have used BPs for longer than the recommended 5 years with no change to the mode of drug therapy.
Methods: The Sunnybrook Research Ethics Board approved this chart audit. Rheumatic disease patients were included if they were older than 18 years with documented BP use ± osteoporosis or low bone mass. There were no exclusion criteria. A data collection tool was developed to assess documentation of osteoporosis status, type and duration of BP use, reasons for BP cessation, and fracture history. One hundred patients at the Sunnybrook Rheumatology Clinic were included and de-identified to ensure confidentiality. Informed consent was obtained from patients to contact family physicians for missing data related to BP duration.
Results: One hundred patient charts have been audited. The mean duration of BP use was 3.2 years with 69% of included patients currently using a BP. BP duration was not documented in 38% of patient charts; at least 13 patients were reported using a BP for over 5 years. For previous BP users, reasons for cessation included change in anti-osteoporosis medication, increased creatinine, and extended duration of treatment. However, this was not documented in 32.2% of previous users. Three patients had an AFF (3%), following 8 years, 9 years, and 15 years of BP therapy respectively.
Conclusion: There is inadequate documentation of initiation, duration, and cessation of BP therapy in rheumatic disease patients. As BP related adverse events are dependent on treatment duration and increase after 5 years, this could compromise patient safety through preventable AFFs. Potential reasons for lack of chart documentation include poor patient recall, neglecting to ask about and document BP therapy, inadequate continuity of care, and insufficient standardization of documentation between health care professionals. Implementation of a BP checklist could be beneficial in ensuring reliable documentation and improve quality of patient care.

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Leukotriene Receptor Antagonist Therapy Associated Eosinophilic Granulomatosis with Polyangiitis: A Case and Literature Review

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Objectives: We report a case of eosinophilic granulomatosis with polyangiitis (EGPA) associated with cysteinyl leukotriene type I receptor antagonist therapy (LTRA). LTRA have been linked to development of EGPA in a number of case reports and series in the literature.
Methods: A 70 year old female with history of asthma and type 2 diabetes mellitus presented with progressive bilateral lower extremity weakness, numbness and ataxia for two days. Due to worsening of her asthma, she was recently given montelukast and mometasone. The day prior to admission, her laboratory investigations were significant for leukocytosis with a peripheral eosinophilia (5510 of 19000 cells/µL). On admission, she had worsening of symptoms and was noted to have a right foot drop, positive Romberg sign and diminished sensation to light touch on plantar surfaces of bilateral feet and ulnar region of left hand. Laboratory investigations on presentation revealed leukocytosis with 48% eosinophils. Immunological studies revealed +MPO-ANCA. A sural nerve biopsy showed angiitis with mild axonal degeneration and eosinophilic infiltrates. She thus met diagnostic criteria for EGPA. Asthma therapy was discontinued and she was given IV corticosteroids with improvement in eosinophilia and mild improvement in neurological symptoms. She was discharged to rehabilitation.
Results: A literature review illustrates an association between the LTRA, montelukast and development of EGPA. The reasons for association of LTRA with EGPA are still debated, however, a number of possible explanations have been hypothesized. The association may simply be confounding by indication, as LTRAs have become common in treatment of asthma and the initial prodromal phase of EGPA is usually characterized by worsening of chronic asthma. This confounding is supported by reports of the variable length of time from introduction of LTRA to development of EGPA. Another hypothesis is that introduction of LTRA in patients with asthma and 'pre-clinical' EGPA may allow reduction of corticosteroid therapy therefore unmasking EGPA symptoms. The pathophysiologic mechanisms of LTRA induced EGPA are unclear. A hypothesis is that LTRAs may lead to an imbalance between blockade of cysteinyl-leukotriene on the cysteinyl-leukotriene receptor 1 and actions of other mediators such as leukotriene B4 (LTB4), known to have biologic effects on proinflammatory cells.
Conclusion: LTRA therapy may have a role in pathogenesis of EGPA and further studies may reveal the underlying mechanism.

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Clinical Effectiveness and Safety of Leflunomide in Inflammatory Arthritis: A Report from the RAPPORT Database

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Objectives: Canadian, American, and European rheumatoid arthritis guidelines do not specifically recommend a trial of leflunomide therapy prior to initiating biologics. However, in 7 of 10 provinces in Canada, patients with rheumatoid arthritis must fail leflunomide prior to receiving provincial drug coverage for biologics. The primary objective was to assess the proportion of patients achieving a clinically meaningful response following an adequate trial of leflunomide, defined as remission (Disease Activity Score-28 (DAS-28) <2.6), low disease activity (DAS-28 <3.2) or a significant clinical improvement or disease response (decrease in

DAS-28 by >1.2 points) at 3 months. The secondary objectives were to assess the proportion of patients who experience adverse effects (AEs), including those who discontinued therapy due to AEs (and/or lack of efficacy) and to assess time to drug failure.
Methods: A retrospective analysis of a population-based cohort selected from the Rheumatoid Arthritis Pharmacovigilance Program and Outcomes Research in Therapeutics (RAPPORT) database in Alberta. Data included demographic characteristics, measures of disease activity, and patient-reported severity, impact, and outcome of adverse effects. Data were analyzed using descriptive statistics and included an incident user (entered RAPPORT with initiation of leflunomide) and prevalent user (entered RAPPORT with initiation of biologic) subgroup analysis.
Results: Of the 1,671 patients who had ever used leflunomide, the majority were females (72.5%) with rheumatoid arthritis (93.8%) who had previously taken methotrexate (97%) and had an average age of 55 years. At baseline, the average DAS-28 score was 5.54 with 92% of patients having swollen and tender joints. In the incident user subgroup (N=249), only 9.6% achieved or maintained remission and 20% achieved or maintained low disease activity with leflunomide at 3 months, with a disease response achieved by 18.9%. Therapy was discontinued due to intolerable AEs by 11% of incident users, compared with 32% of prevalent users (N=1422), and due to inefficacy in 8%. AEs were reported by 34% of incident users; nuisance AEs (hair loss, nausea, stomach pains) (26%) and diarrhea (25%) were most common. Although 68% of patients' AEs were rated moderate in severity, 16% were rated severe, and 25% reported AE persistence. After 1 year 45% of incident users had failed leflunomide therapy.
Conclusion: A minority of patients achieved a clinically meaningful response with leflunomide. Discontinuation due to AEs was uncommon in incident users, but two-thirds reported moderately severe AEs, which may have contributed to drug failure within 1 year for nearly half of users.

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Clinical Effectiveness and Safety of Leflunomide in Inflammatory Arthritis: Patient Reported Data

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Objectives: Canadian, American, and European rheumatoid arthritis guidelines do not specifically recommend a trial of leflunomide prior to initiating biologics. However, in 7 of 10 provinces in Canada patients with rheumatoid arthritis must fail leflunomide prior to receiving provincial drug coverage for biologics. The primary objective of this study was to assess the proportion of patients who self-report an improvement in joint symptoms with leflunomide. The secondary objectives were to assess self-reported adverse effects (AEs) (focusing on infections, liver toxicities and those requiring therapy discontinuation) and their influence on quality of life, and to assess time to drug failure.
Methods: A cross-sectional survey of a population-based cohort with inflammatory arthritis in Alberta. Patients enrolled in the Rheumatoid Arthritis Pharmacovigilance Program and Outcomes Research in Therapeutics (RAPPORT) database that had current or past leflunomide use documented (N=1,956) were surveyed during February and March 2015 using a modified version of a validated patient reported adverse drug event questionnaire. Response items included self-reported leflunomide use, effectiveness, and severity, impact, and outcome of experienced AEs. Data were analyzed using descriptive statistics.

Results: Of the 673 recipients who completed the survey (34% response rate), 80% had rheumatoid arthritis and 54% reported taking leflunomide. Of these, 93% had previously taken methotrexate, 40% took leflunomide and methotrexate simultaneously, and 40% had provincial drug coverage. An improvement in joint symptoms after 3 months of leflunomide was self-reported by 41% of patients. AEs were reported by 55%, with nuisance AEs (hair loss, nausea, stomach pains) (54%) and diarrhea (38%) being most common. Serious infections and liver toxicities were infrequent, reported by 5% and 6% of patients respectively. Therapy was discontinued by 58% of patients: 34% due to AEs and 24% due to both AEs and lack of effectiveness. The majority of respondents who experienced AEs (57%) felt the AE was bothersome and 41% stated the AE unfavourably influenced their daily life. Sixty-seven percent of respondents discontinued leflunomide within 1 year, with 30% occurring within the first 3 months.

Conclusion: An improvement in joint symptoms with leflunomide was self-reported by a minority of patients, with a greater proportion reporting AEs. Serious AEs were uncommon, however a substantial number of patients discontinued leflunomide because of AEs and patient reported quality of life was negatively affected, contributing to the drug failure that occurred within 1 year for over half of respondents.

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Attrition and Participant Characteristics in the Ontario Best Practices Research Initiative (OBRI)

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Objectives: The purpose of this analysis was to assess the generalizability of the Ontario Best Practices Research Initiative (OBRI), by comparing patient characteristics and disease activity of rheumatoid arthritis patients who continue to participate to those who drop out prior to reaching their 3 year follow-up.

Methods: Sixty-one rheumatologists in Ontario recruit patients into the OBRI. As of January 2015, 2650 patients had consented to participate and 1533 of these patients should have reached their 3 year follow-up assessment at this time. A total of 175 (11.4%) patients dropped out before their 3 yr follow-up. Among the drop outs, 109 (7.1%) withdrew consent, 38 (2.5%) were lost to follow-up, and 28 (1.8%) refused to re-consent after 2 yrs of follow-up. In addition to the drop outs, 38 (2.5%) patients had died. 1320 (86.1%) patients remained active participants. Patient characteristics and disease activity at enrollment were compared in the drop outs versus those who remained active. A survival curve was generated to look at time of drop out over the 3 year follow-up period.

Results: Patients who dropped out were similar to those who remained active with respect to age, gender, race, education, employment status, having private insurance, disease duration, number of comorbidities, and living alone. Compared to patients who remained active at their 3 year follow-up, those who dropped out had lower household incomes (17% vs 26% $\geq$ 75,000), higher disease activity scores, mean (SD), (DAS28: 4.9(4.4) vs 4.4(1.6), CDAI: 25.7(14.7) vs 20.9(14.3), HAQ: 1.44(0.78) vs 1.22(0.76), Pain Score: 1.76(0.89) vs 1.48(0.87), RADAI: 4.8(2.2) vs 4.0(2.2)) and were less likely to be taking a biologic at the time of enrolment (8% vs 15%). The survival curve showed the attrition rate to be 11.4% over the first three years of follow-up, with 4.7% of patients dropping out in the first year, 3.5% in the second year, and 3.2% in the third year.

Conclusion: Patients with higher disease activity at enrollment were more likely to drop out. The majority of patients dropped out within the first two years. The OBRI attrition rates were lower than those reported in the BRASS cohort (4.31% per 6 month follow-up cycle)1 and the ARAMIS cohort (6% per year)2. The lower number of drop outs in the OBRI cohort could be attributed to the time invested in rheumatologist site visits by our study monitors and the biannual follow-up by our OBRI telephone interviewers.

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Temporal Trends in Drug Prescription, Utilization and Costs Among Rheumatoid Arthritis (RA) Patients Show Wide Regional Variation Despite Universal Drug Coverage

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Objectives: Monitoring of drug use and costs can: describe trends in expenditures over time, identify regional variations in access and indicate physicians' uptake of best-practice guidelines. Our aim was to describe drug use and costs of biologic (bDMARD) and conventional synthetic Disease Modifying Anti-Rheumatic drug (csDMARDs) in the context of single-payer universal drug coverage.

Methods: We performed a population-based analysis, identifying all RA patients (from 1995 to 2013) who were aged 65 years and older using a validated algorithm (n=37,012). All patients received identical public drug coverage from a single public payer. Prescriptions were determined using the pharmacy claims database of the Ontario Drug Benefit Program. For each patient we recorded the annual number of prescriptions and costs for csDMARDs and bDMARDs and region of residence. Trends in annual drug use and costs were graphed by drug class and regional health authority.

Results: The total number of patients receiving RA medications tripled from 14,222 in 1995 to 37,012 in 2013. During that same time period csDMARD use and costs increased from $2.1M in 1995 to $8.5M in 2013. When bDMARDs were introduced in 2001, 105 patients received bDMARDs (0.4%) increasing to 3226 patients (11%) in 2013. During that period the costs of bDMARDS increased from $0.78M to $54.6M. In 1995, per-patient drug costs in each regional health authority were an average of $500 per patient per year. Since the introduction of bDMARDs in 2001, total cost and per-patient cost variation among regions has increased considerably, with drug expenditure in 2013 ranging from $1200 per patient per year to $2500 per patient per year.

Conclusion: The number of patients with RA increased linearly over time from 1995 to 2013. The proportion of patients receiving csDMARDs grew at the same rate as the population of patients with RA. The introduction of bDMARDs was associated with an exponential rise of bDMARD use and cost over time driving the increase in total drug costs however the use of bDMARDs was lower than in the US where 27% of patients with a mean age of 70 received bDMARDs. When analyzed by region, adoption of bDMARDs was associated with differential and widening variation in regional drug costs over time, indicating unequal use of bDMARD not explained by differences in reimbursement criteria. We hypothesize that regional access to rheumatology care and rheumatologist's varying propensity to prescribe bDMARDs are the primary drivers of inequitable utilization of bDMARDs.

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Persistence with Biologic Monotherapy in Comparison with Combination Therapy with Disease-Modifying Antirheumatic Drugs in Patients with Rheumatoid Arthritis; Results from a Rheumatoid Arthritis Cohort

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Objectives: Clinical evidence suggests concomitant treatment with a biologic Disease-Modifying Antirheumatic Drug (bDMARD) and a conventional synthetic DMARD (csDMARD), especially with methotrexate (MTX) has greater efficacy than treatment with a bDMARD as monotheapy in patients with rheumatoid arthritis (RA). However, not all patients are able to tolerate a csDMARD. Our objective was to compare the persistence of a bDMARD used as monotherapy, versus combination therapy in patients with active RA.

Methods: Physician data were collected from the Ontario Best Practices Research Initiative Rheumatoid Arthritis Registry (OBRI- RA), a clinical registry of RA patients followed in routine care. Inclusion criteria comprised of patients over age 18 years, active RA (defined as ≥1 swollen joint) and started on their 1st bDMARD within 30 days before registry enrolment, or started after enrolment. Combination therapy was defined as treatment with a bDMARD plus at least one csDMARD, while monotherapy was defined as treatment with only a bDMARD. The primary outcome was persistence with 1st bDMARD therapy, which was defined as the length of time the patients continued to receive their first bDMARD therapy. Persistence treatment was examined using Kaplan-Meier survival analysis. Patients were censored at date of 1st bDMARD stop, switch to another bDMARD or at date of last follow-up, whichever came first.

Results: Among 2591 RA patients, 701 patients started their 1st bDMARD within 30 days before cohort enrolment or after enrolment with the mean (standard deviation) of follow-up 1.9 (1.6) person-years. A total of 598 (85.3%) patients were on combination therapy, and 103 (14.7%) patients were on monotherapy. At baseline, there was a similar mean age, proportion of females between the two groups. A TNFα inhibitor was the biologic used in 22.6% and 14.5% of the monotherapy and combination group respectively. The mean time to failure of 1st bDMARD was 4.3 years (95%CI: 3.7-4.9) and 4.6 years (95%CI: 4.3-4.8) in the monotherapy and combination group respectively. At 12 months follow-up, 74% (95%CI: -81) in the monotherapy group and 81% (95%CI: 77 -84) in the combination group remained on their first bDMARD.

Conclusion: Our study demonstrates that a higher proportion of patients on monotherapy failed therapy at 12 months, and the mean time to treatment failure was shorter with monotherapy, but these results were not statistically significant. Although combination therapy is recommended, these real-world results suggest that patients who are unable/unwilling to continue on a csDMARD, bDMARD monotherapy can still provide an efficacious option.