Canadian Rheumatology Association Meeting
Fairmont Empress
Victoria, British Columbia, Canada
February 26 – 29, 2020

The 74th Annual Meeting of The Canadian Rheumatology Association was held at the Fairmont Empress, Victoria, British Columbia, Canada, February 26–29, 2020. The program consisted of presentations covering original research, symposia, awards, and lectures. Highlights of the meeting include the following 2020 Award Winners: Distinguished Rheumatologist, Jamie Henderson; Distinguished Investigator, Paul Fortin; Distinguished Teacher-Educator, Rayfel Schneider; Emerging Investigator, Claire Barber; Emerging Teacher-Educator, Dharini Mahendira; Ian Watson Award for the Best Abstract on SLE Research by a Trainee, Kimberley Yuen; Phil Rosen Award for the Best Abstract on Clinical or Epidemiology Research by a Trainee, Kristina Roche and Eugene Krustev; Best Abstract on Research by a Rheumatology Resident, Julie Mongeau; Best Abstract on Basic Science Research by a Trainee, Sonya Kim; Best Abstract by a Post-Graduate Research Trainee, Carolina Munoz-Grajales; Best Abstract on Quality Care Initiatives in Rheumatology, Arielle Mendel; Best Abstract by a Medical Student, Declan Webber; Best Abstract by an Undergraduate Student, Chloe Lee; Best Abstract by a Rheumatology Post-Graduate Research Trainee, Nancy Maltez; Best Abstract on Research by Young Faculty, Lily Lim; Best Abstract on Spondyloarthritis Research, Anas Samman; Practice Reflection Award, Gold, Steven Katz; Practice Reflection Award, Silver, Bailey Dyck. Lectures and other events included Keynote Lecture by Tim Spector: Inflammatory Diets — The Microbiome; Keynote Address by Paul Fortin, Distinguished Investigator Awardee: The Power of Many in Lupus Research; State of the Art Lecture by Dinesh Khanna: Systemic Sclerosis-related Lung Fibrosis: Management in 2020; Dunlop-Dottridge Lecture by Betty Diamond: Neuropsychiatric Lupus from Mechanisms to Treatment; and the Great Debate: To Diagnose or Not to Diagnose: Be It Resolved That It Is Better to Underdiagnose than Overdiagnose in Rheumatology Practice. Arguing for: Kam Shojania and Andrea Knight, and against: Amanda Steiman and Corrie Baldwin. Topics including rheumatoid arthritis, systemic lupus erythematosus, systemic sclerosis, Sjögren syndrome, psoriatic arthritis, spondyloarthritis, vasculitis, osteoarthritis, fibromyalgia, and their respective diagnoses, treatments, and outcomes are reflected in the abstracts, which we are pleased to publish in this issue of *The Journal*.

Podium

1

A Canadian Evaluation Framework for Quality Improvement in Childhood Arthritis: Key Performance Indicators of the Process of Care

Claire Barber (University of Calgary, Calgary); Marinka Twilt (Alberta Children's Hospital, Calgary); Tram Pham (University of Calgary, Calgary); Gillian Currie (University of Calgary, Calgary); Susanne Benseler (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/ University of Calgary, Calgary); Rae Yeung (The Hospital for Sick Children, Toronto); Michelle Batthish (McMaster University, Hamilton); Nicholas Blanchette (Trillium Health Partners, Toronto); Jaime Guzman (Division of Rheumatology, Department of Pediatrics, BC Children's Hospital & University of British Columbia, Vancouver); Bianca Lang (IWK Health Centre, Halifax); Claire LeBlanc (Montreal Children's Hospital, Montreal); Deborah Levy (Division of Rheumatology, SickKids Hospital; Faculty of Medicine, University of Toronto, Toronto); Christine O'Brien (Hospital for Sick Children, Toronto); Heinrike Schmeling (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Gordon Soon (North York General Hospital, Toronto); Lynn Spiegel (The Hospital for Sick Children, Toronto); Kristi Whitney (Hospital for Sick Children, Toronto); Deborah Marshall (University of Calgary, Calgary)

Objectives: To develop a set of key performance indicators (KPIs) of the process of care for Juvenile Idiopathic Arthritis (JIA) as part of a standardized evaluation framework for the Understanding Childhood Arthritis Network (UCAN) CURE Precision Decisions for Childhood Arthritis project and help build upon quality improvement efforts in Canada.

Methods: An initial list of 37 candidate KPIs identified from a systematic review were reviewed for inclusion by a working group of 3 pediatric rheumatologists. The final list of 14 KPIs were then assessed using a 3 round modified Delphi process based on the RAND/UCLA Appropriateness Method. Ten panelists across Canada were invited to participate based on their expertise in JIA, quality measurement or lived experience as a parent of a child with JIA. During Round 1 and 3, panelists rated each KPI on a 1-9 Likert scale on themes of importance, feasibility and priority. In Round 2, panelists participated in a moderated in-person discussion that resulted in minor modifications to some KPIs. In Round 3, panelists were asked to re-rate the KPIs. KPIs with median scores of ≥ 7 on all 3 questions without disagreement were included in the framework.

Results: All panelists completed Rounds 1 and 3. Ten KPIs met criteria for inclusion after Round 3. Five KPIs addressed routinely measuring important patient outcomes including pain assessment, joint counts, functional status, global assessment of disease activity, and measurement of the clinical Juvenile Arthritis Disease Activity Score. One KPI addressed wait times for consultation and another captured the proportion of JIA patients in the population seen by a pediatric rheumatologist within 1 year of diagnosis. Safety was addressed through KPIs on TB screening, laboratory monitoring, and clinical follow-up. While assessment of functional status using the Childhood Health Assessment Questionnaire and quality of life were deemed important, there were concerns about the availability of this information in usual clinical practice leading to the exclusion of 2 KPIs. Similar concerns led to the exclusion of measures related to uveitis and patient satisfaction.

Conclusion: The proposed KPIs build upon existing KPIs and address important elements of the process of care that should be measured to improve the quality of JIA care. The feasibility of capturing these measures will be tested in various data sources including the prospective data to be captured within the UCAN studies. Subsequent work should focus on development of meaningful outcome KPIs to drive JIA quality improvement in Canada and beyond.

2

A Serum Proteomic Signature Defines Transition From the Preclinical State to Rheumatoid Arthritis

Liam O'Neil (University of Manitoba, Winnipeg); Victor Spicer (University of Manitoba, Winnipeg); Irene Smolik (University of Manitoba, Winnipeg); Xiaobo Meng (University of Manitoba, Winnipeg); John Wilkins (University of Manitoba, Winnipeg); Hani El-Gabalawy (University of Manitoba, Winnipeg)

Objectives: Anti-citrullinated protein antibodies (ACPA) are the primary biomarker for identifying individuals at increased risk for future RA development. However, we have recently shown in a prospective study that most unaffected ACPA+ individuals do not develop RA. We hypothesized that abnormalities in the serum may serve as additional biomarkers in the prediction risk for future disease. The aim of our study was to mine the serum proteome of individuals who ultimately developed RA to detect biomarkers that predict disease onset.

Methods: Using the SOMAscan (slow off-rate modified aptamer) array, we generated quantitative levels of 1307 proteins in serum samples from seventeen first-degree relatives (FDR) of Indigenous North American (INA) RA patients who developed inflammatory arthritis (IA) synovitis after having been followed prospectively for a mean of 3.2 years. All were ACPA+ at time of IA diagnosis. Each individual had two preclinical samples, one at the time of IA onset, and one at an earlier time point. We also analyzed samples from ACPA+ FDR (n = 63) and ACPA- FDR (n = 47) who did not develop inflammatory arthritis. We applied a machine learning lasso regression model to identify a minimum set of proteins that classified patients who transition into clinical arthritis.

Results: Differential expression of 669 proteins were identified between pre-Transition samples (TR-pre) and ACPA negative FDR. ITGA2B and HIST1H3A were the highest upregulated proteins in TR-pre samples, while protease inhibitors SERPINA5 and ITIH4 were highly downregulated in the TR-pre samples. Compared with ACPA- FDR, overlap between TR-pre baseline and non-baseline samples of highly upregulated proteins was 60%, suggesting alterations in the serum proteome occur years before the development of RA. A lasso regression model identified a 23-marker panel that classified TR-pre samples from the larger pool of FDR (ACPA±) serum samples. In a validation cohort (n = 34), the model correctly classified 31/34 samples (sensitivity = 95.6%, specificity = 85.7%, AUC = 0.931). Transition scores extracted from the model were higher in ACPA+ FDR compared to ACPA- FDR (p < 0.001). There were no differences in Transition score comparing TR-pre samples that were remote or close to IA onset.

Conclusion: Compared to at-risk individuals who did not develop IA, clear and reproducible differences in the serum proteome are demonstrable in the serum samples of individuals who ultimately developed IA, even several years before the onset of clinically evident disease. Our findings suggest that a small serum biomarker panel can serve to accurately classify at-risk individuals who have a high likelihood of progressing to develop IA.

3

Axial Spondyloarthritis: Knowledge, Screening and Referral Practices Amongst Primary Care Providers

Laura Passalent (Toronto Western Hospital, Toronto); Christopher Hawke (Toronto Western Hospital, Toronto); Jeff Bloom (Toronto Western Hospital, Toronto); Andrew Bidos (University Health Network, Toronto); Leslie Soever (University Health Network, Toronto); Raja Rampersaud (Toronto Western Hospital, Toronto); Nigil Haroon (Division of Rheumatology, Toronto Western Hospital, University Health Network; University of Toronto, Toronto); Robert Inman (Toronto Western Hospital, Toronto)

Objectives: Early recognition is crucial in improving outcomes in patients with axial spondyloarthritis (axSpA); however, there exists long delay between symptom onset and rheumatology diagnosis. Furthermore, there is uncertainty regarding axSpA screening and referral practices amongst primary care providers. The purpose of this study was to examine the knowledge, screening and referral practices for suspected axSpA within primary care.

Methods: Primary care physicians (MDs), physiotherapists (PTs), chiropractors (DCs) and nurse practitioners (NPs), licensed/registered with an Ontario regulatory college or professional association, were sent an electronic questionnaire via their respective professional institution. The questionnaire was developed based on our results from a qualitative study of primary care axSpA screening and referral practices conducted in 2016 and was piloted by 10 primary care practitioners to strengthen validity. The questionnaire addressed: (i) knowledge of clinical and investigative features of axSpA; (ii) awareness of axSpA screening tools and (iii) referral practices of suspected axSpA. Univariate statistics were used to address the above objectives.

Results: There were 276 respondents: MDs (44.5%), DCs (34%), PTs (19%) and NPs (2.4%); 93.1% worked in urban settings; 61.8% indicated > 10 years of primary care experience. The following were considered "very important" when assessing suspected axSpA: morning stiffness > 30 minutes (81.9%); presence of HLA B27 (66.7%); evaluation of acute phase reactants (46.4%) and radiographs (spine and pelvis) (45.3%). Most respondents "never used" or "were not familiar" with axSpA screening tools (80%). The majority of MDs (90.9%) indicated they would "always" or "often" refer to rheumatology. PTs (90.5%) and DCs (88.0%) would "always" or "often" refer patients back to the MD for further investigation and/or referral, as they are not legislated to conduct these clinical tasks in the province of Ontario. Travel (28.8%) and prolonged wait times (53.2%) were identified as referral barriers. DCs and PTs indicated issues pertaining to scope of practice as barriers to assessing patients with suspected axSpA (82.2%, 50.0%, respectively).

Conclusion: The majority of primary care practitioners demonstrate reasonable knowledge of axSpA clinical features; however, there is little awareness of axSpA screening tools. Although most MDs refer their patients with suspected axSpA for rheumatology consultation, prolonged wait times were identified as a substantial barrier. PTs and DCs identified barriers to axSpA screening and referral related to scope of practice, that if mitigated, could allow for better early detection of axSpA. The results of this study may inform targeted education of primary care practitioners to improve early recognition of axSpA. Supported by a CIORA grant.

4

Identification of Rare Genetic Variants in the Familial Forms of Dupuytren's Disease

Andréa Gauvreau (Faculté de médecine, Université Laval, Quebec); Yassine Ajlil (Centre de recherche du CHU de Québec, Quebec); Frédéric Fournier (Centre de recherche du CHU de Québec, Quebec); Lucie Ratelle (Centre de recherche du CHU de Québec, Quebec); Edith Gagnon (Centre de recherche du CHU de Québec, Quebec); Johann Beaudreuil (CHU Lariboisière, AP-HP, Paris); Elisabeth Petit-Teixeira (GenHotel, Université d'Évry, Université Paris Saclay, Evry); Arnaud Droit (Centre de recherche du CHU de Québec, Quebec); Laetitia Michou (Department of Rheumatology, CHU de Québec-Université Laval, Quebec)

Objectives: Dupuytren's disease is the most common hereditary disorder of the connective tissue. A hereditary component was identified, but the genetic mode of inheritance appears heterogeneous: most frequently autosomal dominant and rarely autosomal recessive or mitochondrial (maternal). Few genetic studies using the genomic DNA have been performed to date. This project aimed at identifying rare genetic variants in familial forms of Dupuytren's disease by whole exome sequencing.

Methods: Informative families with three or more affected participants of Dupuytren's disease were recruited. Salivary samples were collected, and DNA extraction was performed. The whole exome was captured in four to five individuals per family in three different families. The sequencing was performed with the technique «paired-end» on the Illumina HiSeq 2000 Sequencing System. The raw data were assembled and aligned, then filtered according to the minor allele frequency ≤ 0.03 and the in-silico prediction of damaging functional effects. The intra-familial segregation analysis of the variants of interest was further studied in 48 individuals, with or without Dupuytren's disease, coming from 28 extended families, by targeted sequencing in 77 genes identified by the whole exome analysis. Only the genetic variants validated by Sanger sequencing and perfectly segregating with the disease phenotype within the extended families were considered as potential genetic variants of Dupuytren's disease.

Results: Among the seventy-seven salivary samples collected from participants of 28 different families, 48 samples were analysed in this project. The whole exome analysis was performed in fourteen participants coming from three distinct families, who displayed an autosomal dominant pattern of inheritance. Thirty-four, 27 and 39 rare and predicted damaging variants were identified in each family, respectively. Many of these variants of interest, involved in the function of muscular cells, in the synthesis of keratin or in the mitochondrial function, were found to be recurrent in other families when performing the targeted sequencing. The Sanger sequencing confirmed the intrafamilial segregation of two rare and damaging variants in a locus previously associated with Dupuytren's disease in genome-wide association studies: the locus C8ORF34_SULF1.

Conclusion: The whole exome analysis in three familial forms of Dupuytren's disease has identified rare genetic variants of interest in the pathophysiology of this disorder. This study confirmed the feasibility of detecting rare genetic variants by whole exome sequencing in the familial forms of Dupuytren's disease. The functional impact of the rare genetic variants identified remains to be further evaluated by in vitro studies.

5

Mapping Real-World Psoriatic Arthritis Patients to Clinical Trial Eligibility Criteria

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Objectives: Results of real-world studies may be extrapolated to overall patient populations, whereas clinical trials present outcomes can be limited in generalizability due to stringent eligibility criteria. This analysis sought to assess the proportion of psoriatic arthritis (PsA) patients treated with golimumab in Canadian routine care qualifying for a pivotal randomized controlled trial (RCT) and explore potential differences in outcomes.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. PsA patients initiating treatment with subcutaneous golimumab, including both biologic-treatment naïve and experienced (< 6 months), were categorized as "Eligible" or "Non-Eligible" based on inclusion/exclusion criteria of the GO-REVEAL RCT. Reasons for non-eligibility, and between-group differences in baseline characteristics, were assessed with univariate statistics. Impact of eligibility on achieving the following clinical outcomes at 6/12 months was assessed using logistic regression adjusting for respective baseline level/status: Minimal Disease Activity (MDA: 5/7 MDA criteria), Very Low Disease Activity (VLDA: 7/7 MDA criteria), PASI75, HAQ < 0.5, and absence of enthesitis and dactylitis. Treatment retention was evaluated using Cox regression adjusting for disease duration and eligibility. Safety was evaluated through incidence of adverse events (AEs).

Results: 171 patients were included: 48 (28.1%) were considered Eligible and 123 (71.9%) were considered Non-Eligible for GO-REVEAL. Main reasons for ineligibility were unconfirmed active PsA at baseline (≥ 2 TJC28 and SJC28, BSA > 0: n = 103/123; 83.7%) and previous biologic use (n = 40/123; 32.5%). Mean [SD] baseline disease parameters were significantly (p < 0.05) higher in Eligible vs. Non-Eligible patients for MDGA 0-10 (6.6 [1.9] vs. 5.2 [2.0]), PtGA 0-100 (32.3 [31.6] vs. 15.3 [20.8]), TJC28 (12.0 [6.5] vs. 7.0 [6.6]), SJC28 (9.1 [4.5] vs. 4.0[4.4]), enthesitis (3.3 [4.4] vs. 1.8 [2.8] affected joints), PASI (4.7 [6.8] vs. 1.8 [2.4]) and HAQ (1.4 [0.6] vs. 1.0 [0.7]). Non-Eligible patients were significantly less likely to achieve PASI75 at month 6 and 12 (OR [95% CI]: 0.27

[0.11 -0.64], 0.25 [0.09 – 0.64], respectively] and HAQ < 0.5 at month 6 (0.29 [0.10-0.84]) and remain on treatment (HR [95% CI] for discontinuation: 2.4 [1.4-4.2]). The incidence of AEs was comparable between groups (Eligible vs. Non-Eligible: 64.6% vs. 68.3%) without remarkable differences in the safety profile.

Conclusion: The majority of PsA patients treated with golimumab in routine care would not have been eligible for GO-REVEAL. Non-eligibility was driven primarily by an absence of active PsA confirmation, resulting in higher baseline disease activity in Eligible patients. Eligibility to GO-REVEAL was a significant positive predictor of PASI and HAQ improvement.

6

Development of an Affordable and Remotely-Accessible Tool in Joint Injection and Arthrocentesis

Kristina Roche (Memorial University of Newfoundland, St. John's); Sam Aseer (Memorial University of Newfoundland, St. John's); Shaina Goudie (St. John's); Eugene Krustev (University of Calgary, Calgary); Evan Walters (Memorial University of Newfoundland, St. John's); Craig Martin (St. John's); Adam Dubrowski (Ontario Tech University, Oshawa); Proton Rahman (Memorial University, St. John's)

Objectives: Design a three-dimensional printed knee model for under $150 CAD which could be used for landmarking, injection, and arthrocentesis by medical personnel. Performing joint injections and arthrocentesis is a required skill in medical training. Medical students must understand the implications of the procedures, as well as consenting, landmarking, injection technique, and post-injection care. The skill continues to be an integral part of residency training and practice in multiple specialty areas, particularly Emergency Medicine, Family Medicine, Orthopedic Surgery, and Internal Medicine, including General Internal Medicine and Rheumatology. Staff members in these areas are expected to perform injections and arthrocentesis within their scope of practice. Resident self-confidence and skill in performing knee injections and arthrocentesis have been shown to increase when educational interventions involving task trainers are employed (Wilcox et al., 2006). Amoako et al. describe similar results, where subjects showed increased self-reported confidence in performing knee injections after being trained using simulators (2018). Anecdotally, much of the learning around injection and arthrocentesis technique happens in the clinical setting. Based on this experience, this team sought to create a three-dimensional printed knee model which would be more affordable than current commercial models. It would also be more accessible to learners, particularly in rural settings.

Methods: In the early stages of model creation a panel of three simulation experts was consulted to provide feedback on the implementation process and qualitative feedback on the design using the Consolidated Framework for Implementation Research questionnaire. Further changes to the working model were made based on qualitative feedback from stakeholders. The penultimate model was assessed using the Rapid Product Assessment - Knee Arthrocentesis questionnaire by staff physicians.

Results: The initial model was composed only of the internal bone anatomy of the knee. After assessing the utility of the structure and optimizing the knee angle based on feedback from two medical students, one resident, and three staff rheumatologists, the soft tissue structures to surround the bony landmarks were created. Minor updates occurred throughout the creation process and when the team was satisfied with the changes the model was reassessed with appropriate stakeholders. In total five staff rheumatologists and three orthopedic surgeons provided feedback on realism of injection and aspiration as well as the physical attributes of the model. Their feedback was incorporated to create the final model.

Conclusion: The current iteration can be used for both injection and arthrocentesis. It is cost effective and easily accessible. Phil Rosen Award for the Best Abstract on Clinical or Epidemiology Research by a Trainee

7

Effectiveness of the Making it Work™ Program at Improving Presenteeism and Work Cessation in Workers with Inflammatory Arthritis – Results of a Randomized Controlled Trial

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Objectives: Arthritis often leads to presenteeism (decreased at-work productivity) and permanent work disability, the worst occupational outcome of a disease, leading to reduced quality of life and cost to society. Yet, health services addressing employment needs of people with arthritis are lacking. We evaluated the effectiveness of the Making-it-Work™ (MIW), an online program developed to help people with inflammatory arthritis (IA) deal with employment issues.

Methods: A multi-center RCT evaluated the effectiveness of MIW at improving presenteeism and work cessation (WC) over two years. Participants were recruited from rheumatologist practices, consumer organizations and arthritis programs, in three provinces. Eligibility criteria: diagnosis of IA, employed, age 18-59, and concerned about ability to work. Participants were randomized 1:1 to MIW or usual care plus printed material on workplace tips. MIW consists of five online self-learning modules and group meetings, and individual vocational counselling and ergonomic assessments. Questionnaires were administered every 6 months. Outcomes were presenteeism [Rheumatoid Arthritis Work Instability Scale (RA-WIS)], time to WC ≥ 6 months, and time to WC ≥ 2 months (secondary outcome). Baseline characteristics (age, gender, ethnicity, occupation, education, disease duration and self-employment) were collected. Intention-to-treat longitudinal analysis of RA-WIS using linear mixed effect regression models with 2-year comparison as primary endpoint and survival analysis for time to WC using Kaplan-Meier and Cox Proportional Hazard models were performed. Robustness analyses were conducted via missing values imputed using last observation carried forward and worse possible outcomes; square root transformation of RA-WIS outcome; and adjusting for baseline covariates. SAS version 9.4 was used.

Results: A total of 564 participants were recruited, with 529 (94%) completing 2-year follow-up. Baseline characteristics were similar between groups. Difference in means of RA-WIS scores was significantly lower in the intervention group from 6 months onwards, with the greatest difference observed at 2 years (-1.78, 95% CI: -2.7, -0.9, p < 0.0001), yielding a standardized effect size of 32%. Satisfactory robustness was observed. Work cessation occurred less often in intervention than control groups, but only reached statistical significance for WC ≥ 2 months (WC ≥ 6 months: 31 versus 44 events, aHR 0.70, 95% CI: 0.44, 1.11, p-value: 0.13; WC ≥ 2 months: 39 versus 61 events, aHR: 0.65, 95% CI: 0.43, 0.98, p-value: 0.04).

Conclusion: Results of the RCT reveal the program was effective at improving presenteeism and preventing short-term WC. Effectiveness at preventing long-term work disability will be assessed at 5 years. This program fills one of the most important unmet needs for people with inflammatory arthritis.

8

Pulmonary Hypertension is Not Increased in Limited Cutaneous Systemic Sclerosis Compared to Diffuse Cutaneous Subset When Adjusting for Survival

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Objectives: Pulmonary hypertension (PH) is a life-threatening complication of systemic sclerosis (SSc), thought to be more commonly found in limited cutaneous (lcSSc) compared to diffuse (dcSSc) subset. Since lcSSc has a better prognosis, it is unclear whether a higher occurrence of PH in lcSSc is due to survival bias, especially when longer disease and older age increase PH. The purpose of this study was to compare the frequency of PAH in SSc subsets after adjusting for only those at risk (survivors vs. deceased).

Methods: We assessed PH incidence and survival, after accounting for death as a competing event, in a large multi-center cohort of 1431 SSc patients (43% dcSSc, 57% lcSSc, mean age at SSc onset 48 ±13 years) from Canadian Scleroderma Research Group registry, and explored predictors of PH development and survival. Competing risk analysis was performed to compare cumulative incidence of PH between disease subsets. Survival was analyzed by Cox proportional hazards analysis with demographic, clinical, and laboratory characteristics as predictor variables.

Results: 157 patients had PH either confirmed by RHC or postmortem. They had longer disease and older age at SSc diagnosis in lcSSc and more severe Raynaud's, digital ulcers and gastrointestinal involvement in dcSSc. In incident PH cohort (n = 44), 32% died over a follow-up of 4.7 years (range 1-14). Cumulative incidence of PH was comparable in dcSSc and lcSSc after adjustment for age, sex and SSc-related autoantibodies (HR = 1.82, p = 0.08). Survival from PH onset was similar in lcSSc and dcSSc. Male and anti-Scl70 were associated with earlier development of PH from SSc onset (p < 0.002).

Conclusion: Cumulative incidence of PH, after accounting for death as competing event, and survival were comparable in SSc subsets.

9

Cannabis Use for Chronic Arthritis: Patient Utilization, Knowledge, and Attitudes

Sandi Yao (University of Saskatchewan, Saskatoon); Regina Taylor-Gjevre (University of Saskatchewan, Saskatoon); Bindu Nair (University of Saskatchewan, Saskatoon)

Objectives: In light of cannabis legalization, it is reasonable to anticipate that some arthritis patients may request information on cannabis use or potentially experiment with treatments without physician guidance. There is therefore utility in gauging the level of interest and current use patterns of cannabis within this patient population.

Methods: In this mixed methods study, 101 diagnosed arthritis patients that attended the rheumatology outpatient clinics at Royal University Hospital were interviewed on their utilization, knowledge, and attitudes in regard to cannabis. Patterns in qualitative data were then assessed by thematic analysis. Frequencies and descriptive characteristics were identified in quantitative data.

Results: It was found that close to a quarter of the interviewed arthritis patients had a history of cannabis use for medical reasons. Half of these patients felt no improvement in their joint pain. Other reported beneficial effects included better sleep and increased relaxation. More than half of the patients felt that the level of evidence available for medicinal cannabis was unsatisfactory. Among these patients, there was a desire for more physician input, expert consensus, and long-term studies rather than anecdotal evidence. Major concerns about cannabis use, from most prevalent to least prevalent, included health effects, legal regulations, potential for impairment, and insufficient information.

Conclusion: These findings highlight the wide spectrum of patient experiences and concerns with cannabis. There are some patients that report a strong belief in the efficacy of cannabis and employ it as a supplemental therapy. Others are curious to explore potential benefit of cannabis. As many patients consider their health providers to be their primary resource for decision-making, physicians should be prepared to give a medical opinion on cannabis using the best evidence available. Future directions may involve completing controlled clinical trials to assess efficacy of cannabis in arthritis patients and to guide appropriate management, including standardized dosing and route of administration.

10

Arthritogenicity of Homocitrullinated Peptides in a Mouse Model of Rheumatoid Arthritis

Lillian Barra (Western University, London); Sheri Saunders (Western University, London); David Bell (Western University, London); Garth Blackler (Western University, London); Patrick Lac (Western University, London); Patti Kiser (Western University, London); John Trant (University of Windsor, Windsor); Ewa Cairns (Western University, London)

Objectives: Most rheumatoid arthritis (RA) patients express antibodies to post-translationally modified antigens, including citrullinated and homocitrullinated (carbamylated) proteins/peptides. Homocitrulline and citrulline are structurally similar and immune responses to peptides containing either of these modifications are cross-reactive. It is unclear if immune responses to citrullinated, homocitrullinated or both peptides are pathogenic for RA. The aim of this study is to determine whether homocitrullinated peptides induce arthritis in a mouse model of RA.

Methods: We used DR4-transgenic (DR4tg) mice that express human MHCII molecules containing the Shared Epitope and no murine MHCII. DR4tg and wild-type B6 mice were immunized with a synthetic homocitrullinated peptide (HomoCitJED) or PBS control. Some of these mice also received intra-articular (i.a.) HomoCitJED in one knee and PBS in the other knee. Immune responses in these mice were measured for serum antibody production by ELISA at days 10, 30, 50, 70 and 100 after HomoCitJED immunization to the following antigens: HomoCitJED, homocitrullinated fibrinogen, citrullinated fibrinogen, cyclic citrullinated protein/peptide 2 and a synthetic citrullinated peptide (CitJED) containing the same backbone as HomoCitJED. We also measured cytokine/chemokine levels by multiplex at days 10 and 70. Discriminant analysis was performed to determine if the cytokine/chemokine profile of the mice could be differentiated by sex and strain. Arthritis was assessed by measuring joint swelling with calipers and by histopathology.

Results: HomoCitJED was found to bind more strongly to the Shared Epitope than CitJED by in silico molecular modelling. DR4tg mice immunized with HomoCitJED expressed IgG antibodies more frequently to homocitrullinated than citrullinated antigens (N = 8-29 at each time point). B6 mice also responded to homocitrullinated antigens, but not citrullinated antigens. Antibody levels were similar in male and female mice. However, sex differences were detected in the serum cytokine/chemokine profiles with females having a higher ratio of IL-1alpha to IL-5, suggesting imbalances in immune regulation. Significant joint swelling was observed in the knees of DR4tg mice that received HomoCitJED i.a. (N = 14) compared to the contralateral PBS injected knee (N = 14) with no sex differences detected. Histopathologic findings of arthritis included synovial thickening and pannus, immune cell infiltration of the soft tissues, hypervascularity and cartilage destruction. PBS immunized mice did not have detectable immune responses or arthritis.

Conclusion: Mice expressing human Shared Epitope developed immune responses to homocitrullinated and citrullinated antigens and an RA-like arthritis when homocitrullinated antigens were present in the joint. These findings support an arthritogenic role for homocitrullinated antigens in RA.

11

Parent-reported Medication Side Effects of Commonly Used Medications in Children With Juvenile Idiopathic Arthritis: Results From the CAPRI Registry

Katherine McGuire (University of Ottawa, Ottawa); Gaelle Chedeville (McGill University, Montreal); CAPRI Registry Investigators (Vancouver); Jaime Guzman (Division of Rheumatology, Department of Pediatrics, BC Children's Hospital & University of British Columbia, Vancouver)

Objectives: To quantify the impact of parent-reported medication side effects (SEs) on quality of life in children with juvenile idiopathic arthritis (JIA) and to describe the frequency and severity of SEs associated with commonly used medications.

Methods: We used data from newly-diagnosed patients enrolled in the Canadian Alliance of Pediatric Rheumatology Investigators (CAPRI) JIA Registry from February 2017-May 2019. Children are enrolled within 3 months of diagnosis and information about disease activity, medications, SEs and outcomes is collected prospectively at every clinic visit. The SE frequency and mean SE severity (0 = no problem at all, 10 = very severe) with common monotherapy and combination drug treatments were calculated. Mixed effect models were used to assess the impact of SE severity on the parent global assessment (PG, 0 = child is doing very well, 10 = child is doing very poor) and the patient-reported Quality of My Life (QoML, 0 = my life is the worst, 10 = my life is the best), after controlling for pain intensity and active joint count.

Results: 249 patients were included (median age 7.9 years, 60% female). Most patients had oligoarthritis (44%), RF-negative polyarthritis (19%) or enthesitis-related arthritis (16%). One or more SE were reported at 371 of 884 clinic visits (42%, CI 39-45) with a mean SE severity of 3.3 (SD 2.2). The most common SEs were abdominal pain (13% of visits), loss of appetite (12%), mood changes (12%) and nausea (10%). A one unit increase in SE severity corresponded to a 0.185 units worsening in PG (CI 0.125-0.245, p < 0.001) and a 0.087 units worsening in QoML (CI 0.010-0.164, p = 0.03), after controlling for pain and active joint count. SEs were reported in 35% of visits with NSAID monotherapy (mean severity 3.1, n = 314), 59% with methotrexate (MTX) monotherapy (mean severity 2.7, n = 98), 54% with NSAID + MTX (mean severity 3.2, n = 147) and 68% with combined treatments including prednisone (mean severity 3.8, n = 64). The SE frequency related to NSAID + oral MTX combined therapy was 49% of 82 visits (mean severity 3.0), and to NSAID + subcutaneous-MTX was 60% of 65 visits (mean severity 3.4; p = 0.175 by chi square).

Conclusion: Parent-reported SE had a statistically significant impact on PG and QoML assessments. NSAID + subcutaneous MTX treatment did not have fewer SE than NSAID + oral MTX treatment. Parent-reported SE frequency and severity tended to increase as treatment intensified.

12
Geographic Variation in the Prevalence of Rheumatoid Arthritis in Alberta: A Spatial Analysis

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Objectives: Rheumatoid arthritis (RA) is a chronic autoimmune disease affecting approximately 1% of the Canadian population, and a leading cause of work disability. Rheumatologists are primarily located in large urban centers, creating potential differences in access to RA care. There is a lack of evidence for health planners to determine local needs for RA health services. This research assesses the geographic variation in RA prevalence in Alberta across the rural-urban continuum, and by local geographic areas (LGA) using spatial analysis. Our findings help to inform the targeted dissemination of evidence-based interventions.

Methods: We used Alberta Health administrative databases to identify RA cases between April 1 2015 and March 31 2016 using a validated case definition: ≥ 16 years at diagnosis, residing in Alberta, 1 hospitalization or 2 claims (at least 8 weeks apart) within 2 years, with International Classifications of Disease (ICD)-9-CM codes 714.x, or ICD-10-CA codes M05.X and M06.X. Age-sex standardized prevalence rates per 1,000 population were calculated with direct standardization. Standardized rate ratios (SRR) were calculated to compare the RA prevalence rate of each rural-urban area to the rest of Alberta. We applied global Moran's I, a spatial autocorrelation index, to assess whether RA prevalence in a LGA is similar to surrounding LGAs, and hotspot analysis to identify LGAs having significantly higher RA prevalence compared to the provincial average and being surrounded by other LGAs with high RA prevalence.

Results: There were 38,350 RA cases (female 68%, n = 26,236). The age-sex standardized RA prevalence rate was 11.81 cases per 1,000 population (95% CI: 11.80-11.81). Approximately 70% of RA cases resided in Metro (e.g. Calgary and Edmonton) and Urban areas (e.g. Medicine Hat and Lethbridge). The highest age-sex standardized rate was observed in Rural (14.46, 95% CI: 14.45-14.47, SRR = 1.28), compared to the lowest in Metro areas (10.69, 95% CI: 10.68-10.69, SRR = 0.82). The RA prevalence by LGA ranged from 4.7 to 30.6 cases. The global Moran's I index was 0.37 with a Z score of 4.67 based on a spatial weight matrix defined by a fixed distance (40 km). We identified seven hotspots (LGAs) with an average prevalence rate of 27.7 cases (ranging from 24.1 to 30.6), among which six were located in the Rural and one in the Rural Remote areas.

Conclusion: The findings highlight notable Rural-Urban variation in RA prevalence in Alberta with some local areas having significantly higher RA prevalence. Our findings can inform strategies aimed at reducing geographic disparities by targeting areas with high healthcare needs. Supported by a CIORA grant.

13
Examining the Role of Dipeptidyl Peptidase-4 in Psoriatic Disease

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Objectives: Psoriatic arthritis (PsA) is an inflammatory arthritis that develops in up to 30% of patients with the skin disease psoriasis. PsA can lead to joint damage and disability and increased mortality risk. Studies suggest that the chemokine CXCL10 plays an important role in PsA. CXCL10 is regulated post-translationally by dipeptidyl peptidase-4 (DPPIV). We tried to determine if DPPIV plays a role in psoriatic disease by measuring DPPIV enzyme activity (EA) and DPPIV and CXCL10 levels in serum samples from patients and healthy controls (HC) and in synovial fluid from PsA and OA patients.

Methods: Serum samples were acquired from 80 treatment-naïve patients with PsA, 80 patients with psoriasis without arthritis (PsC, treatment naive), and 40 HC. Additionally, 40 samples were collected from a subset of the PsA patients after 24 weeks of treatment with methotrexate (MTX). Synovial fluid (SF) and matched serum samples were collected from 15 PSA and OA patients (matched for age and sex). DPPIV(EA), serum DPPIV and CXCL10 were quantified by commercially available kits. Differences between groups were assessed using Mann-Whitney U test or Wilcoxon signed-rank test and correlations were tested by Spearman's correlation.

Results: PsA patients were 2/3 male, mean age 49.4 (13.1) years and mean psoriasis area and severity index (PASI) score of 5.6 (7.2). PsC patients were 2/3 male, age 49.6 (13.0) years, PASI score 5.2 (6.4). HC were 2/3 male, age 45.2 (11.1). Treatment cohort were 50% male, age 48.2 (11.7) years, PASI score 5.8 (8.0). DPPIV(EA), Serum DPPIV and CXCL10 levels were significantly different in all three cohorts, higher in PsA vs PS (p = 0.02, FC1.1). DPPIV(EA) and serum DPPIV levels negatively correlated with serum CXCL10 levels in PsA patients (r = -0.353, p = 0.01; r = -0.271, p = 0.002, respectively). DPPIV(EA), Serum DPPIV and CXCL10 levels were significantly higher in PSA SF vs OA SF. DPPIV(EA) and DPPIV levels in SF had high positive correlation with matched serum samples (r = 0.857, p = 0.01; r = 0.919, p = 0.0001, respectively). DPPIV(EA) and serum DPPIV

levels significantly increased following treatment, while CXCL10 levels decreased significantly. Change in DPPIV levels negatively correlated with change in CXCL10 levels post treatment (r = -0.455, p = 0.05).

Conclusion: CXCL10 may be regulated post translationally by DPPIV as we observe a negative correlation in PsA patients. DPPIV synovial fluid levels may also be an important indicator of joint inflammation in PsA patients, due to its high positive correlation in synovial and serum levels. The increase in DPPIV may be a marker of response to MTX treatment in PsA patients.

14

An Initiative to Improve Timely Glucocorticoid Tapering in Vasculitis

Arielle Mendel (University of Toronto, Toronto); Daniel Ennis (University of British Columbia, Vancouver); Shirley Lake (University of Toronto, Toronto); Simon Carette (University of Toronto, Toronto); Christian Pagnoux (University of Toronto, Toronto)

Objectives: Vasculitis guidelines recommend scheduled glucocorticoid (GC) tapering to avoid toxicity. In an audit of 130 consecutive new patients on GC assessed in our tertiary Vasculitis Clinic (July 2017-October 2018), 33 (25%) were taking prednisone >10mg above target dose, based on GC initiation date or last flare. Lack of confidence with GC tapering, concern for disease relapse, and referral wait times were identified as barriers to timely tapering. We aimed to increase the proportion of new patients taking appropriate GC doses to > 90% by August 2019.

Methods: Interventions were (1) triaging patients on prednisone > 20 mg to be seen in < 2 months (2) "fax-back" tapering suggestions to referring physicians based on current ANCA-associated vasculitis (AAV) and large vessel vasculitis (LVV) recommendations. Initially, referring physicians' offices were contacted 1-2 weeks following the "fax-back" to determine if physicians personally saw the suggestions, and modifications were made to "fax-back" format to increase physician receipt. The primary outcome was the proportion of patients taking "appropriate" GC (≤ 10 mg above target dose) at first visit, measured through interrupted time series analysis (July 2017-August 2019). Other measures included clinic wait times, the proportion of patients starting to taper GC, and disease flares during tapering.

Results: Following physician triaging (December 2018-August 2019), mean wait times for new patients on GC decreased from 82 days (95% CI 71-92) in the preceding 6 months to 64 days (95% CI 57-70). Physician receipt of the "fax-back" GC tapering suggestions increased from 29% (January/February 2019) to 68% (April/May 2019). Among patients referred for AAV/LVV, comparing pre-intervention (July 2017-January 2019) to post-intervention (February-August 2019) periods, mean prednisone dose at first visit decreased from 30 mg (95% CI 27-33) to 22 mg (95% CI 18-27), and the proportion of patients who had started to taper GC by their first visit increased from 84/118 (71% [95% CI 62-79]) to 40/43 (93% [95% CI 81-89]). However, the proportion ultimately taking "appropriate" GC doses, overall and among the AAV/LVV subset, did not significantly increase by the end of the measurement period. Potential/definite disease flares during tapering were similar in the 6 months before and after interventions (18% vs 19%).

Conclusion: In this novel "GC stewardship" initiative to limit avoidable harm in vasculitis, we decreased wait times among GC-users. "Fax-back" tapering suggestions were associated with increased tapering and lower GC doses at first visit. However, resources required for this intervention may limit sustainability, necessitating alternative educational strategies to improve timely GC tapering in vasculitis. Best Abstract on Quality Care Initiatives in Rheumatology Award.

Posters

1

The Effect of TNF-Inhibitor Therapy on Structural Progression in Ankylosing Spondylitis Patients: A Systematic Review and Meta-Analysis

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Objectives: To systematically review the effect of tumor necrosis factor-alpha inhibitor (TNFi) therapies (i.e. infliximab, etanercept, adalimumab, certolizumab, and golimumab) on radiographic progression in ankylosing spondylitis (AS) patients as evaluated by the modified Stroke Ankylosing Spondylitis Spine Score (mSASSS).

Methods: Pubmed, MEDLINE, EMBASE, and the Cochrane Library databases were searched from inception to August 2019. All comparative and non-comparative studies that evaluated the clinical effectiveness of TNFi on structural radiographic progression as assessed by mSASSS change at a minimum follow-up of one year were included. The Newcastle Ottawa scale and Cochrane Collaboration Risk of Bias Tool were utilized to assess the methodological quality. Pooled analysis was performed for continuous and binomial variables where appropriate. Inter-rater reliability of mSASSS status and change scores were assessed with ICC.

Results: Twenty-one studies were identified with a total of 4460 patients (mean age: 40.4 years [range 25.3-50 years]; 76% males; mean baseline mSASSS: 12.7 units [range 5.5-19.8 units]). All studies (3 randomized and 18 observational studies) were considered to have moderate-to-high methodological quality. The inter-rater reliability of mSASSS status and change scores from 14 of the 21 studies were excellent (ICC ranges, 0.91-0.99) and moderate-to-excellent (ICC ranges, 0.58-0.90), respectively. Overall, from the 21 studies, 11/21 (50%) demonstrated a delayed effect in mSASSS in AS patient administered TNFi. When stratifying these studies into those with ≤ 4 years of follow-up and > 4 years follow up, 3/11 (27%) and 8/10 (80%) studies respectively indicated a delayed effect of mSASSS with TNFi in AS patients. Pooling for meta-analysis from four comparative studies (1697 patients) with formal controls and study durations ranging from 4-10 years, indicated that TNFi treated patients had reduced odds of radiographic progression [OR, 0.79; (95% CI, 0.68 to 0.91); p = 0.0008; I2 = 0%].

Conclusion: The meta-analysis confirmed that greater than four years of TNFi usage was associated with reduced radiographic progression by mSASSS. This systematic review confirmed that mSASSS has good-to-excellent inter-rater reliability in AS. In addition, the narrative analysis of the data from 21 studies indicated that studies with greater than four years of follow up had reduced structural radiographic progression with TNFi use in AS patients.

2

Real-World Effectiveness of Secukinumab in the Treatment of Ankylosing Spondylitis in Canada: Retrospective Analysis Using Data from the Patient Support Program

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Objectives: Secukinumab, a fully human monoclonal antibody that selectively inhibits interleukin-17A, has demonstrated sustained efficacy with a favorable safety profile for up to 5 years for ankylosing spondylitis (AS) treatment in the MEASURE 1 and 2 clinical trials. This study aims to assess the real-world effectiveness of secukinumab in Canada leveraging data collected as part of the patient support program (PSP).

Methods: In Canada, secukinumab was approved for AS in April 2016. A PSP is available to patients initiated on therapy. Patient demographics, previous biologic therapy, and disease activity (BASDAI) are collected to support reimbursement requirements. Here we present a retrospective data analysis for patients having provided consent and who received ≥1 dose of secukinumab until 2-May-2019. We also describe BASDAI response in a cohort where BASDAI scores were captured pre- and post-secukinumab initiation (BASDAI cohort). BASDAI scores are presented as: mean absolute score; proportions reaching ≥ 2 absolute point reduction in score and proportions reaching ≥ 50% reduction in score (BASDAI50). Secukinumab retention rates are reported at 6 and 12 months. Results were stratified by prior biologic use.

Results: As of 2-May-2019, 1,913 patients received ≥ 1 dose of secukinumab. Mean age was 45.9 (12.6) years and 51.4% were female. Overall, 19.5% (n = 373) of patients were biologic-naive and 29.7%, 28.5% and 22.2% had received 1, 2, and ≥ 3 biologic agents prior to secukinumab, respectively. The majority of biologic-experienced patients were switched from an anti-TNF agent; adalimumab (30.9%) being the most common. The BASDAI cohort comprised of 588 patients. In biologic-naive patients (n = 118), mean baseline BASDAI was 6.8 (1.5), mean time from secukinumab start to follow-up BASDAI assessment was 162.2 (134.63) days. Mean follow-up BASDAI was 3.7 (2.0), 70.3% reached ≥ 2 absolute point reduction in score and 50.0% reached BASDAI50. In biologic-experienced patients (n = 470), mean baseline BASDAI was 7.0 (1.6), mean time from secukinumab start to follow-up BASDAI assessment was 199.6 (155.9) days. Mean follow-up BASDAI score was 4.7 (2.1), 58.5% reached ≥ 2 absolute point reduction in score and 29.6% reached BASDAI50. The 6- and 12-month secukinumab retention rates were higher in biologic-naive patients (85.2%, n = 231/271 and 76.8%, n = 129/16) compared to biologic-experienced patients (76.3%, n = 952/1,247 and 61.6%, n = 580/941), respectively.

Conclusion: In this Canadian real-world effectiveness study, secukinumab reduced AS disease activity (BASDAI), irrespective of prior biologic use as seen in the MEASURE clinical trial program. Greater effectiveness and drug retention rates were observed in biologic-naïve patients.

3

Effectiveness of Adalimumab on Extra-articular Manifestations and Clinical Outcomes Among Patients With Ankylosing Spondylitis in a Canadian Real-world Observational Study: Results From the COMPLETE AS Study

Louis Bessette (Laval University, Quebec); Samuel Silverberg (Etobicoke General Hospital, Toronto); Jaqueline Stewart (University of British Columbia, Penticton); Marie-Claude Laliberté (AbbVie, St-Laurent); Majed Khraishi (Department of Medicine, Memorial University of Newfoundland, St. John's)

Objectives: COMPLETE-AS is an ongoing observational study among biologic-naïve Canadian adults with active ankylosing spondylitis (AS), who, per the judgement of their treating physician, require treatment change from their current non-steroidal anti-inflammatory drug (NSAID) and/or conventional synthetic disease-modifying anti-rheumatic drug (csDMARD) regimen. The aim of this analysis was to compare the 12-month effectiveness of adalimumab vs. csDMARD/NSAID with respect to extra-articular manifestations (EAMs) and clinical outcomes.

Methods: Patients enrolled between July 2011-March 2018 were included. Time to new-onset EAM or flare-up/exacerbation was assessed using Kaplan-Meier survival analysis. Changes over time in BASDAI, BASFI, and SF-12, were evaluated using mixed models with repeated measures, adjusting for baseline levels. Time to achievement of the following

endpoints was assessed using multivariate cox regression, also baseline-adjusted: 50% improvement from baseline in BASDAI (BASDAI50), minimum clinically important improvements (MCIIs) in BASDAI ($\Delta \geq 1.1$), BASFI ($\Delta \geq 0.6$), SF-12 physical component score (PCS; $\Delta \geq 4.4$), and SF-12 mental component score (MCS; $\Delta \geq 3.1$), and low disease activity (LDA) for BASDAI (< 4) and BASFI (< 3.8).

Results: A total of 451 adalimumab-treated patients and 187 csDMARD/NSAID-treated patients were included. Patients in the adalimumab group reported higher BASDAI (6.4 vs. 5; p < 0.001) and BASFI (5.5 vs. 3.7; p < 0.001) scores, and lower SF-12 PCS score (31.6 vs. 37; p < 0.001) at baseline. Baseline demographics/characteristics were otherwise comparable. No between-group differences were observed with respect to EAM incidence/flare-up. However, significantly (p < 0.001) greater reductions in BASDAI (mean adjusted change [95% CI]: -2.1 [-2.3, -1.9] vs. -0.7 [-1.1, -0.3]) and BASFI (-1.7 [-1.9, -1.5] vs. -0.6 [-0.9, -0.2]) were observed among adalimumab-treated patients at 3 months, which persisted at 12 months (-2.3 [-2.5, -2.0] vs. -0.8 [-1.2, -0.3] and -2.0 [-2.3, -1.8] vs. -0.4 [-0.8, 0.0], respectively). Adalimumab-treated patients were significantly more likely to achieve BASDAI50, BASDAI LDA, BASDAI-MCII and BASFI-MCII [HR (95%CI): 1.8 (1.3, 2.5); 1.6 (1.2, 2.0); 1.7 (1.3, 2.3); 1.5 (1.1, 1.9), respectively]. Corresponding 12-month cumulative probabilities for achieving each endpoint in adalimumab- vs. csDMARD/NSAID-treated patients were as follows; BASDAI50: 75.5% vs. 53.7%; BASDAI LDA: 85.0% vs. 69.7%; BASDAI-MCII: 92.8% vs. 77.7%; BASFI-MCII: 90.4% vs. 79.7%). Achievement of BASFI LDA [HR (95%CI): 1.2 (0.9, 1.5)], SF-12 PCS MCII [1.5 (0.9, 2.5)], SF-12 MCS MCII [1.2 (0.7, 1.9)], was not statistically different between treatments.

Conclusion: Among patients with active AS, adalimumab significantly improved disease activity and functional capacity over 12 months when compared to csDMARD/NSAIDs. There was no difference in new onset EAMs/flare-up between both groups.

4

Prevalence and Predictors of Depression among Patients with Ankylosing Spondylitis and Psoriatic Arthritis in a Canadian Real World Observational Cohort: Results from the COMPLETE Studies

Louis Bessette (Laval University, Quebec); Majed Khraishi (Department of Medicine, Memorial University of Newfoundland, St. John's); Viktoria Pavlova (McMaster University, Hamilton); Jaqueline Stewart (University of British Columbia, Penticton); Valencia Remple (AbbVie Corporation, St. Laurent)

Objectives: Ankylosing spondylitis (AS) and psoriatic arthritis (PsA) are known to cause physical, emotional, social and psychological impairment. This analysis aimed at evaluating the prevalence of depression and identifying sociodemographic and disease-related factors associated with depression among PsA and AS patients.

Methods: Patients eligible for the COMPLETE studies are anti-TNF-α naïve adults with active AS or PsA requiring change in their treatment. Depression was defined as BDI score $\geq$ 20 or use of antidepressant/anxiolytic medications at baseline. Depression symptoms were assessed with the BDI considering % of patients with scores of 2 or 3 (moderate-to-severe symptoms). Logistic regression was used to identify sociodemographic and disease-related parameters associated with baseline depression. The correlation of the BDI score and the following parameters was assessed with the Pearson coefficient (r): age, disease duration, PsA-specific parameters (28-tender [TJC] and swollen joint count [SJC], patient [PtGA] and physician [MDGA] global assessments), and AS-specific parameters (BASDAI, BASFI, morning stiffness, number of extra-articular manifestations [EAMs]).

Results: 492 AS and 333 PsA patients were included with a mean (SD) age of 42.7 (13.2) and 51.5 (12.2), respectively, and disease duration of 5.4 (9.1) and 14.7 (13.7) years. The prevalence of baseline depression was 24.6% for AS and 25.5% for PsA. The most commonly reported depression symptoms were loss of energy (33.2% and 26.2%), changes in sleeping pattern (41.3% and 34.9%), fatigue (35.3% and 28.6%), and loss of interest

in sex (21.7% and 21.9%), for AS and PsA, respectively. In univariate analysis, female gender, unemployment due to disability or other reasons, and increased BASDAI, BASFI, and morning stiffness were significantly (P < 0.05) associated with baseline depression among AS patients. For PsA, significantly (P < 0.05) associated parameters included female sex, unemployment due to disability, and increased TJC, PtGA and morning stiffness. Weak correlations were observed between the BDI score and BASFI (r = 0.425), BASDAI (r = 0.375), morning stiffness (r = 0.285), and number of EAMs (r = 0.114) for AS; and TJC (r = 0.155), MDGA (r = 0.132), and PtGA (r = 0.451) for PsA. In multivariate analysis for AS, higher BASFI (OR = 1.32; P < 0.001), female sex (OR = 1.89; P = 0.007) and unemployment due to other reasons (OR = 1.91; P = 0.017); and, for PsA, lower disease duration (OR = 0.97; P = 0.018), and higher PtGA (OR = 1.04; P < 0.001) were identified as significant independent predictors of baseline depression.

Conclusion: Depression in AS and PsA patients was common in this real-world cohort. Female sex, unemployment, and higher disease activity for AS, and shorter disease duration along with higher PtGA for PsA were significant independent predictors of depression.

5

Does Depression Predict Future Disease Status and Improvements in Disease Parameters? Results from the COMPLETE studies, a Canadian Real World Observational Cohort

Majed Khraishi (Department of Medicine, Memorial University of Newfoundland, St. John's); Valencia Remple (AbbVie Corporation, St. Laurent); Louis Bessette (Laval University, Quebec)

Objectives: Depression in Psoriatic Arthritis (PsA) and Ankylosing Spondylitis (AS) patients has been associated with increased disease activity, decreased functionality, and lower persistence with treatment. We assessed if baseline depression in PsA or AS patients predicts future disease status and improvement in disease parameters.

Methods: COMPLETE is a Canadian observational cohort of anti-TNF-α naïve adults with PsA and AS, requiring a change in their treatment. Depression was defined as BDI score $\geq$ 20 or use of anti-depressants and/or anxiolytic medications. Multivariate logistic regression was used to assess baseline predictors of achieving low disease activity (LDA) in BASDAI (< 4) and BASFI (< 4) for AS patients; or DAPSA ($\leq$ 13) and DAS28 (< 3.2) LDA, DAPSA ($\leq$ 4) and DAS28 (< 2.6) remission, and BSA < 3% for PsA patients. Maximum improvements in BASDAI, BASFI, DAPSA, DAS28, HAQ-DI, and SF-12 physical (PCS) and mental (MCS) component scales (PsA only) over 12 months were assessed using multivariate linear regression and resulting least square means (LSMs).

Results: 492 AS and 333 PsA patients with available criteria for depression at baseline were included; mean (SD) age was 42.7 (13.2) and 51.5 (12.2) years, respectively, and disease duration was 5.4 (9.1) and 14.7 (13.7) years. The majority of both AS (70.9%) and PsA (66.4%) patients initiated adalimumab treatment at baseline. The baseline prevalence of depression was 24.6% and 25.5% in AS and PsA, respectively. Upon multivariate adjustment, depression in AS patients was associated with significantly lower odds of BASDAI-LDA (OR: 0.51, p = 0.021) and BASFI-LDA (OR: 0.52, p = 0.045) during treatment. In these analyses, positive HLA-B27 status was also identified as a significant positive predictor of either outcome (ORBASDAI-LDA: 1.91, p = 0.016; ORBASFI-LDA: 1.98, p = 0.029), while older age was a negative predictor of BASFI-LDA (OR: 0.98, p = 0.044). Similarly, patients with depression experienced significantly lower improvements in BASDAI (LSM: -1.72 vs. -2.44; p = 0.007), and BASFI (-1.46 vs. -2.02; p = 0.029) compared to those without depression. Among PsA patients, depression was associated with lower odds of DAPSA remission (OR: 0.35, p = 0.070). No association was observed between depression and DAPSA-LDA, DAS28-LDA or remission, and BSA < 3%. Significantly lower improvements in DAPSA (LSM: -11.00 vs. -14.66; p = 0.047) and SF-12 MCS (-3.01 vs. 4.36; p = 0.007) were observed among patients with depression.

Conclusion: A significant proportion of AS and PsA patients suffer from

depression. Baseline depression negatively affected treatment outcomes in both AS and PsA patients. Whether this is due to differences in the assessment of patient-reported outcomes or due to physiological differences remains to be confirmed.

6

Prevalence of Work Disability and Predictors of Work Productivity among Employable Patients with Ankylosing Spondylitis and Psoriatic Arthritis in a Canadian Real World Observational Cohort: Interim Results from the COMPLETE Studies

Louis Bessette (Laval University, Quebec); Valencia Remple (AbbVie Corporation, St. Laurent); Samuel Silverberg (Etobicoke General Hospital, Toronto); Viktoria Pavlova (McMaster University, Hamilton); Majed Khraishi (Department of Medicine, Memorial University of Newfoundland, St. John's)

Objectives: Maintenance of patients with ankylosing spondylitis (AS) and psoriatic arthritis (PsA) in the work force and return to employment are important treatment outcomes. This analysis aimed at describing the prevalence of unemployment due to disability at baseline and identifying factors associated with work productivity loss in AS and PsA patients followed in Canadian routine care.

Methods: Patients eligible for the COMPLETE studies were anti-TNFα naïve adults with active AS or PsA requiring change in their treatment. This interim analysis included patients treated with adalimumab or non-biologic DMARDs that were either employed or on disability at baseline. Work productivity was measured by the Work Limitations Questionnaire (WLQ). Depression was defined as a BDI score ≥ 20 and/or treatment with anti-depressants/anxiolytics at baseline. Multivariate generalized linear models were used to identify determinants of % WLQ productivity loss (WLQ-PL) at 6 and 12 months of treatment, and changes from baseline. Least Square Means (LSM) for WLQ-PL improvement were reported from the multivariate model.

Results: 486 AS and 292 PsA patients were included with a mean (SD) disease duration of 5.2 (8.6) and 12.8 (12.1) years, respectively, and age of 41.7 (11.6) and 48.3 (10.5) years. At baseline, 13.4% of AS patients and 17.8% of PsA patients were unemployed due to disability. Among employed patients, the mean (SD) baseline WLQ-PL score was 9.2% (5.7) in AS patients and 8.3% (6.0) in PsA patients. After 6 months of treatment significant improvement was observed in both patient populations (ΔAS [95% CI]: -2.7% [-3.4,-2.0]; ΔPsA [95% CI]: -2.1% [-2.9,-1.3]) which was maintained until 12 months. Among AS patients, after adjusting for baseline age, sex, tobacco use, HLA-B27 status, treatment group, depression, and baseline BASFI and WLQ-PL scores, presence of depression (LSM: -0.2% vs. -2.5%; p = 0.016) and female sex (LSM: -0.7% vs. -2.0%; p = 0.047) were identified as significant negative predictors of improvement in work productivity at 6 months, while increased baseline work productivity was a positive predictor of improvement. Among PsA patients, other than higher baseline work productivity (positive predictor of improvement), no predictors were identified. However, a negative trend was observed for presence of depression (LSM: -0.4% vs. -2.5%; p = 0.068).

Conclusion: We observed a significant proportion of AS and PsA patients unemployed in this real-world Canadian cohort. Treatment with adalimumab or non-biologic DMARDs was associated with significant improvement in work productivity irrespective of potential risk factors. Presence of depression was identified as an independent negative predictor of improvement in work performance/productivity.

7

A Head-to-Head Comparison of Ixekizumab and Adalimumab in Biologic-Naïve Patients with Active Psoriatic Arthritis: 52-Week Efficacy and Safety Outcomes from a Randomized, Open-Label, Blinded Assessor study

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Objectives: Ixekizumab (IXE) was superior to adalimumab (ADA) at Week (Wk) 24 for simultaneous achievement of ACR50 and PASI100 in SPIRIT-H2H trial. We report overall efficacy and safety, and efficacy in subgroups defined by concomitant methotrexate use through Wk52.

Methods: Patients with active PsA fulfilling CASPAR criteria, $\geq 3/66$ tender and $\geq 3/68$ swollen joints, $\geq 3\%$ psoriasis BSA involvement, no prior treatment with bDMARDs, and prior inadequate response to ≥ 1 conventional synthetic (cs)-DMARD, were randomized 1:1 to open-label IXE or ADA (label dosing according to presence/absence of moderate-to-severe psoriasis [baseline BSA $\geq 10\%$, PASI ≥ 12, and sPGA ≥ 3) through 52 wks. Outcomes included simultaneous achievement of ACR50+PASI100, ACR20/50/70, PASI75/90/100, NAPSI = 0, Minimal Disease Activity (MDA), Very Low Disease Activity (defined as MDA 7/7), Disease Activity index for Psoriatic Arthritis Low Disease Activity (DAPSA) remission (score 4), LEI = 0, SPARCC Enthesitis Index = 0, Leeds Dactylitis Index-Basic = 0, and HAQ-Disability Index ≥ 0.35 change from baseline. Nine patients with active PsO and BSA$\geq 3\%$ were assessed as PASI = 0 at baseline, a medical inconsistency that was resolved using medical judgement. These patients were considered PASI100 responders if PASI = 0 and BSA = 0 at post-baseline visit. Efficacy was also analyzed in subgroups based on concomitant methotrexate usage. Data were analyzed using logistic regression analysis with non-responder imputation for missing data. Safety outcomes are summarized for patients who received ≥ 1 dose of study treatment.

Results: Overall, 87% and 84% of patients randomized to IXE and ADA, respectively, completed Wk52. IXE provided significantly greater response than ADA for simultaneous ACR50+PASI100 (IXE = 39%, ADA = 26% at Wk52; p < 0.001). IXE performed at least as well as ADA at Wk52 for all other outcomes. IXE was superior to ADA on PsO outcomes starting from Wk4 through Wk52. Simultaneous ACR50+PASI100 response with IXE was numerically greater than ADA, regardless of concomitant methotrexate use. Methotrexate use by treatment interaction was significant for ACR20/50/70 at Wk52. Treatment-emergent adverse events (AEs) occurred in 73.9% (IXE) and 68.6% (ADA) of patients. Serious AEs occurred in 4.2% (IXE) and 12.4% (ADA) of patients, and discontinuations due to AEs occurred in 4.2% (IXE) and 7.4% (ADA) of patients; no deaths occurred.

Conclusion: IXE provided significantly greater simultaneous joint and skin improvement versus ADA as early as Wk8 and through Wk52. IXE performed at least as well as ADA across multiple musculoskeletal PsA domains and showed superiority in the skin domain through Wk52. Safety outcomes for IXE and ADA were consistent with their previously established safety profiles.

8

Improvement in the Signs and Symptoms of Psoriatic Arthritis with Ixekizumab Compared to Adalimumab in Patient Subgroups Defined by Baseline Disease Characteristics

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Objectives: We report Week 24 efficacy of ixekizumab (IXE) and adalimumab (ADA) in subgroups defined by baseline disease characteristics.

Methods: SPIRIT-H2H is a 52-week, multicenter, open-label, blinded assessor study in bDMARD-naïve patients who were inadequate responders

to conventional synthetic DMARD (csDMARD) with active psoriatic arthritis (PsA; ≥ 3 tender joint count [TJC] and ≥ 3 swollen joint count [SJC]) and plaque psoriasis (body surface area [BSA] ≥ 3%). All patients met Classification Criteria for PsA (CASPAR). Patients were randomized 1:1 to IXE or ADA on-label dosing based on presence/absence of moderate-to-severe psoriasis (BSA ≥ 10% + Psoriasis Area and Severity Index [PASI] ≥ 12 + static Physician Global Assessment [sPGA] ≥ 3). A blinded assessor measured TJC, SJC, enthesitis, dactylitis, PASI, sPGA, BSA, and fingernail psoriasis. This post hoc subgroup analysis assessed efficacy in patients with baseline enthesitis (presence/absence), dactylitis (presence/absence), fingernail psoriasis (presence/absence), BSA (10% cutoff), and CRP (6 mg/L cutoff). Week 24 outcomes were compared between IXE and ADA at ACR20/50/70 responses and minimal disease activity (MDA). Nine patients with active PsO and BSA ≥ 3% were assessed as PASI = 0 at baseline, a medical inconsistency that was resolved using medical judgement. These patients were considered PASI100 responders if PASI = 0 and BSA = 0 at post-baseline visit. Missing data were imputed by nonresponder imputation. While the post hoc analysis was not controlled for multiplicity, all comparisons were analyzed by Fisher's exact test.

Results: There were no statistical differences between IXE and ADA at ACR20 and ACR50 response rates across all of the examined subgroups at Week 24. ACR70 responses were comparable across subgroups, except significantly more IXE-treated patients with baseline fingernail psoriasis achieved ACR70 than ADA-treated patients (p = .02). Significantly more IXE- than ADA-treated patients achieved MDA-6 in subgroups with baseline enthesitis (p = .002), without dactylitis (p = .015), with fingernail psoriasis (p < .001), CRP ≤ 6 mg/L (p = .046), and BSA ≥10% (p = .01). All other subgroups analyzed demonstrated comparable efficacy on IXE and ADA. A limitation of this analysis is that it was completed post hoc, not controlled for multiplicity, and patients were not stratified by these baseline disease characteristics.

Conclusion: IXE and ADA are associated with comparable efficacy in the signs and symptoms of PsA in patient subgroups defined by baseline enthesitis, dactylitis, fingernail psoriasis, BSA, and CRP.

9

Prevalence and Risk Factors for Cardio-Metabolic Abnormalities in Patients with Inflammatory Arthritis Attending Cardio-Rheumatology Primary Prevention Clinics

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Objectives: Cardio-metabolic abnormalities are common in patients with inflammatory arthritis (IA) but tend to be under-recognized and under-treated. We aimed to compare the prevalence and risk factors for cardio-metabolic abnormalities between patients with rheumatoid arthritis (RA), psoriatic arthritis (PsA) and ankylosing spondylitis (AS).

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

Results: A total of 358 patients (201 RA, 124 PsA, 33 AS) were assessed (mean age 59 ± 10.5 years, 68.7% female). Hypertension was reported in 33%, dyslipidemia in 26.8%, diabetes mellitus in 8.9% and overweight/obesity in 69.7%. Newly detected elevations in lipids were frequent for triglycerides (12.2%,), non-HDL-cholesterol (16.8%,) and LDL-cholesterol (2.7%). Newly diagnosed hypertension and diabetes occurred in 14.6% and 1.5%, respectively. A total of 32.8% patients required a change or initiation of medications for their cardio-metabolic abnormalities (21.7% lipid-lowering therapy, 14.6% aspirin, 11.1% anti-hypertension therapy). Patients with PsA had the highest prevalence of cardio-metabolic abnormalities including dyslipidemia, obesity and hypertension. Having hypertension (prior or new diagnosis) was associated with PsA vs. RA (adjusted odds ratio (OR) 3.23, 95% confidence interval (CI) 1.70, 6.12). Elevated triglyceride levels were associated with PsA vs. RA (adjusted β 0.32, 95% CI 0.06, 0.59). Elevated non-HDL cholesterol was associated with PsA vs. RA (adjusted β 0.41, 95% CI 0.14, 0.68). Elevated BMI was associated with PsA vs. RA (adjusted β 3.11, 95% CI 1.36, 4.86). No significant association was found between cardio-metabolic abnormalities and AS vs. PsA or RA.

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

10

Evaluation of Sex Differences in the Efficacy and Safety of Tofacitinib in Patients with Active Psoriatic Arthritis: A Post Hoc Analysis of Two Phase 3 Randomized Controlled Trials

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Objectives: Differences in the effectiveness of psoriatic arthritis (PsA) treatments between sexes are not well understood, although these have been reported with tumor necrosis factor inhibitors (TNFi). Tofacitinib is an oral Janus kinase inhibitor for the treatment of PsA. This post hoc analysis evaluated the impact of sex on tofacitinib efficacy and safety in PsA.

Methods: Pooled data were included from two Phase 3, placebo-controlled, randomized studies of tofacitinib (OPAL Broaden [NCT01877668]; OPAL Beyond [NCT01882439]) in patients with active PsA and inadequate response to ≥1 csDMARD (and were TNFi-naïve; OPAL Broaden) or to ≥1 TNFi (OPAL Beyond). Analyses included patients randomized to tofacitinib 5 mg twice daily (BID), tofacitinib 10 mg BID, or placebo (switching to tofacitinib 5 or 10 mg BID at Month [M]3). Efficacy endpoints included: American College of Rheumatology 20 (ACR20) and ACR50 response rates; change from baseline (Δ) in Leeds Enthesitis Index (LEI), ΔDactylitis Severity Score (DSS), and ΔFunctional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F); proportion of patients achieving a minimal clinically important difference (MCID) for Health Assessment Questionnaire-Disability Index (HAQ-DI) (≥ 0.35). Safety outcomes were assessed up to M6. Demographic and baseline disease characteristics were tested using one-way ANOVA for continuous parameters and chi-square for categorical parameters. Analyses are based on observed cases and presented without multiplicity adjustment in comparing between sexes.

Results: Overall, 710 patients (317/393 male/female) were included (tofacitinib 5 mg BID, 117/121; tofacitinib 10 mg BID 100/136; placebo 100/136, respectively). Baseline characteristics were broadly similar between sexes; exceptions included higher FACIT-F score (less fatigue) in males, higher HAQ-DI in females (tofacitinib 5 mg BID and placebo), and higher baseline DSS in males (placebo). ACR20 and ACR50 response rates were similar between sexes at M3. No differences between sexes were shown in ΔFACIT-F, ΔLEI, and ΔDSS, or HAQ-DI MCID at M3. In general, no differences in efficacy between sexes were observed at M6 and M12 in either tofacitinib group. Up to M6, numerically more females than males

had adverse events (AEs), serious AEs, severe AEs, discontinuations due to AEs, gastrointestinal disorders, and nervous system disorders (system organ class) with tofacitinib 5 and 10 mg BID.

Conclusion: In general, no clinically meaningful differences between sexes were observed in the efficacy of tofacitinib 5 and 10 mg BID up to M12. Some numerical differences in safety outcomes with tofacitinib were observed between sexes. Results further characterize the efficacy and safety of tofacitinib in patients with active PsA.

11

Evaluation of Standard and Proposed Reference Values for Entheseal Thickening by Using Musculoskeletal Ultrasound

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Objectives: Enthesitis is a characteristic feature of axial spondyloarthritis (axSpA) and ultrasound (US) improves the accuracy of entheseal assessment. Entheseal thickening is one of the sonographic signs of enthesitis, therefore, accurate detection of entheseal thickening is important. Standard reference values for entheseal thickness are not well established, and have only been tested in a small number of patients. The objective of this study was to determine the frequency of entheseal thickening on US using the existing and proposed new cut offs. The impact of gender, obesity, smoking and physical activity levels on entheseal thickness was also analyzed.

Methods: Eighty healthy subjects and 100 patients with axSpA had US scans of the insertions of triceps, quadriceps, Achilles tendons, and plantar fascia and origins and insertions of patellar tendons. Sensitivity, specificity, odds ratio (OR) and accuracy were calculated according to accepted cut off levels obtained from the literature and proposed cut offs calculated as the mean $\pm$ 2 SD in our healthy group.

Results: Thickening according to the current cut off levels was found in 76.3% (61/80) of healthy participants, in 20.4% (196/960) of the entheses and was found in 84% (84/100) of axSpA patients, in 33.4% (396/1200) of the entheses. Thickening according to the proposed cut off levels decreased the frequency of thickening in healthy controls and axSpA patients with thickening found in 17.5% (14/80) of the controls and in 4.7% (45/960) of entheses in healthy participants and 41% (41/100) of the patients and in 9.2% (111/1200) of the entheses in axSpA patients. The new proposed cut off levels increased the specificity in all anatomical areas, however at the cost of decreasing sensitivity, except at the triceps tendon. The only anatomical site where thickness had a value to discriminate disease from health was at the Triceps tendon, with an OR of 13 (95% CI: 4.0-44.8) according to the current cut offs and 10.3 (95% CI: 4.0-26.6) with the proposed cut off levels. Men and overweight or obese subjects had higher thicknesses at all entheseal sites, in both healthy and axSpA subjects.

Conclusion: The majority of healthy participants had evidence of entheseal thickening according to current cut off values, and the frequency decreased when measured against proposed cut off levels. However, the proposed cut off levels had poor sensitivity while improving specificity. The triceps tendon was the only site where thickness could assist to discriminate disease from health based on both current and proposed cut off levels.

12

A Case of Hypophysitis with Histopathological Features of IgG4-Related Disease and Subsequent Development of Granulomatosis with Polyangiitis. Overlap or a Single Entity?

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Anti-neutrophilic cytoplasmic antibody associated vasculitis (AAV) and immunoglobulin G4-related diseases (IgG4-RD) are known to share clinical features. Some authors have proposed that a true overlap does exist, while others have proposed that the elevated IgG4 levels and positive-IgG4 plasma cells infiltrating tissues are both part of the same AAV.

Objective: We report a patient who presented with IgG4-RD hypophysitis that further developed AAV in keeping with granulomatosis with polyangiitis.

Methods: Case report and review of the literature.

Results: BJQ is a 39-year-old woman who presented with a history of compressive pituitary symptoms, including bitemporal hemianopsia, galactorrhea, hyperprolactinemia and hypothyroidism. She was found to have a pituitary lesion on brain MRI and subsequently had transsphenoidal resection. Biopsy immunostaining revealed positive-plasma IgG4 cells with no granulomas. However, IgG4 serum levels were unknown at that time. Two months later she developed polyarthritis, scleritis, oral ulcers, necrotic skin lesions, hoarseness, shortness of breath, fever and weight loss. Patient was found anemic and had highly elevated inflammatory markers, elevated IgE levels (460ug/L; normal $\leq$ 240), positive cANCA by immunofluorescence with PR3 specificity by ELISA (1,328 CU; normal $\leq$ 20) and significantly elevated IgG4 serum levels (5.89g/L; normal = 0.03–2.01). Chest imaging revealed a right upper lobe pulmonary opacity and a skin biopsy of the lower extremity rash confirmed the presence of leukocytoclastic vasculitis. A clinical diagnosis of granulomatosis with polyangiitis was made. Given suspicious pituitary pathology and elevated IgG4 levels, an overlap of IgG4 related disease and AAV was also considered. She received high dose prednisone and weekly oral methotrexate. She had resolution of all of her presenting symptoms, but two months later she developed recurrence of scleritis, a new leukocytoclastic vasculitic-like rash, new hematuria and decreased renal function. Repeat MRI brain showed no recurrence of hypophysitis. Methotrexate was therefore stopped, and she was started on IV methylprednisolone and subsequently IV cyclophosphamide.

Conclusion: Our patient initially presented with positive-IgG4 plasma cells hypophysitis suggestive of IgG4-RD and shortly thereafter developed full blown GPA. Although GPA and IgG4-RD may coexist, our case speaks more in favor with the notion that elevated IgG4 levels and IgG4 plasma cell infiltration are features of the same AAV clinicopathological spectrum.

13

First Biologic Drug Persistence in Patients With Ankylosis Spondylitis Compared to Non-radiographic Axial Spondyloarthritis: A Canadian Assessment

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Objectives: Axial spondyloarthritis (axSpA) includes ankylosing spondylitis (AS) and non-radiographic axial spondyloarthritis (nr-axSpA). Currently, both are managed with similar biologic drugs. However, there is a lack of evidence for nr-axSpA therapies. The primary objective was to compare persistence to first biologic between AS and nr-axSpA patients. Secondary objectives were to examine the effect of concomitant use of nonsteroidal anti-inflammatory drugs (NSAIDs) and/or disease-modifying antirheumatic drugs (DMARDs) on drug persistence, and to evaluate predictors for drug discontinuation.

Methods: Subjects diagnosed with either AS or nr-axSpA were identified from the SpondyloArthritis Research Consortium of Canada (SPARCC) registry between 2003 and 2018. Demographic, clinical and prescription data were recorded by clinicians at baseline and subsequent annual visits. To assess drug persistence, Kaplan-Meier curves were constructed from the time of biologic initiation until discontinuation and compared using the log-rank test. Subgroup analyses were performed according to infliximab, etanercept, adalimumab, golimumab, concomitant DMARDs and NSAIDs. Cox proportional hazard models were used to identify factors associated with discontinuation.

Results: A total of 385 subjects were analyzed (349 AS, 36 nr-axSpA). AS subjects showed longer drug persistence compared to nr-axSpA subjects (p-value < 0.01); specifically, the proportion persistent to first biologic at year 1 (75% AS vs 60% nr-axSpA), year 3 (61% vs 40%), year 5 (50% vs 26%) and year 10 years (39% vs 20%). Examination by drug revealed

statistically superior persistence for AS patients, compared to nr-axSpA prescribed with infliximab (p-value = 0.03), but not for those prescribed with adalimumab (p = 0.15), etanercept (p = 0.25), golimumab (p = 0.47). Concomitant use of biologic with DMARDs and/or NSAIDs did not show any significant difference between the two groups (p-value > 0.05). After adjustment for sociodemographic, clinical and disease factors, diagnosis of nr-axSpA was the better predictor of drug discontinuation, having 75% more nr-axSpA patients stopping their treatment compared to AS patients (HR, 1.75; 95% CI, 1.01-3.04).

Conclusion: In this real-world study, we observed longer drug persistence in bio-naive AS subjects initiating a first biologic agent compared to those with nr-axSpA, especially to infliximab. Further research is needed to identify effective predictors of treatment response in axSpA, including those with nr-axSpA.

14

The Patient Journey towards Diagnosis of Axial Spondyloarthritis in Canada. Results from the IMAS Survey

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Objectives: Axial Spondyloarthritis (axSpA) is an insidious disease with an elusive diagnosis. The purpose of this analysis was to identify factors associated with diagnostic delay (DD).

Methods: The International Map of Axial Spondyloarthritis (IMAS) is a cross-sectional on-line survey of unselected patients with self-reported axSpA conducted in 21 countries around the world and endorsed by the Axial Spondyloarthritis International Federation (ASIF). IMAS aims to capture the patients' perspective of the humanistic, psychological and physical burden of axSpA. The Canadian adaptation of the survey included a review of the questionnaire by an advisory board of axSpA patients and a national steering committee composed of the Canadian Spondylitis Association, local rheumatologists and axSpA patients. Canadian participants were recruited between August 2018 and February 2019. Socio-demographics, BASDAI, spinal stiffness, functional limitation and psychological distress (General Health Questionnaire, GHQ-12) were collected. DD was patient-reported and defined as the time between symptom onset and formal diagnosis. An analysis was conducted to characterize factors associated with increased diagnostic delay. The sample was divided in two comparison groups according to DD (reduced (≤ 5 years) vs. extended (> 5 years). Mann-Whitney and Kruskal-Wallis homogeneity tests were used to compare the mean of numeric variables and a Chi square homogeneity test was used to compare the distribution of categorical variables.

Results: 542 axSpA patients were recruited. Mean age was 44.3 ± 13.9 years, 63.1% were female, 66.4% married and 81.0% at least college educated. Mean BASDAI was 5.3 ± 2.1 and mean GHQ-12 score (psychological distress) was 4.0 ± 3.8. Regarding pharmacotherapy, 82.8% of patients had previously been treated with NSAIDs and 58.7% with biologics. Patients visited 2.9 ± 1.6 different HCPs and undertook 6.4 ± 10.5 medical tests before diagnosis. DD was 9.0 ± 10.5 years. The factors most strongly associated with DD were being older (p < 0.001), female (p = 0.005), greater functional limitation (p = 0.033) and HCPs consulted prior to diagnosis (p < 0.001).

Conclusion: Despite recent advances, diagnostic delay continues to be a barrier to optimal care for Canadian axSpA patients. Considerable DD, together with a high number of HCP visits and medical tests prior to diagnosis, illustrate the convoluted axSpA patient journey. The present findings highlight the need for patient-centric management and monitoring improvements to shorten the journey towards diagnosis and facilitate treatment access.

15

Are Work-related Issues Related to Higher Burden of Disease in Canadian axSpA Patients? Results From the IMAS Survey

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Objectives: Axial Spondyloarthritis (axSpA) is a chronic inflammatory condition with a negative impact on working life. This analysis investigates factors associated with work-related issues (WRIs) in Canadian axSpA patients.

Methods: The International Map of Axial Spondyloarthritis (IMAS) is a cross-sectional on-line survey of unselected patients with self-reported axSpA conducted in 21 countries around the world and endorsed by the Axial Spondyloarthritis International Federation (ASIF). IMAS aims to capture the patients' perspective of the humanistic, psychological and physical burden of axSpA. The Canadian adaptation of the survey included a review of the questionnaire by an advisory board of axSpA patients and a national steering committee composed of the Canadian Spondylitis Association, local rheumatologists and axSpA patients. Canadian participants were recruited between August 2018 and February 2019. Socio-demographics, WRIs, BASDAI, spinal stiffness, functional limitation and psychological distress (General Health Questionnaire, GHQ-12) were collected. WRIs explored included: days taken off work, missing work for HCP visits, difficulty fulfilling working hours, reducing working hours, taking disability leave, quitting job, changing work schedule, and impacts on professional life. The survey sample was divided into two comparison groups, depending on whether there was a presence or absence WRIs and factors associated with WRIs were characterized. Mann-Whitney and Kruskal-Wallis homogeneity tests were used to compare the mean of numeric variables and a Chi square homogeneity test was used to compare the distribution of categorical variables.

Results: 542 axSpA patients were recruited. Mean age was 44.3 ± 13.9 years, 63.1% were female, 66.4% married and 81.0% at least college educated. Mean BASDAI was 5.3 ± 2.1 and mean GHQ-12 was 4.0 ± 3.8. Regarding pharmacotherapy, 82.8% of patients had previously been treated with NSAIDs and 58.7% with biologics. 81.0% of patients reported experiencing at least one WRI due to axSpA. The most frequently reported WRIs were "days taken off work" (43.4%) and "missing work for HCP visits" (35.3%). A bivariate analysis showed that WRIs were associated with younger age (p < 0.001), higher BASDAI (p < 0.001), functional limitation (p = 0.005), psychological distress (p < 0.001) and moderate level of stiffness (p = 0.028).

Conclusion: WRIs were associated to worse patient-reported outcomes (PROs) (both physical and psychological). Until validation of a treat-2-target approach, there is a need to manage Canadian axSpA patients with effective therapies, maximizing impact on PROs, associated WRIs and overall quality of life.

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Ixekizumab Improves Fatigue, Pain, and Sleep up to 52 Weeks in Patients with Radiographic Axial Spondyloarthritis

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Objectives: This analysis evaluates the impact of ixekizumab (IXE) on fatigue, spinal pain, and sleep pattern in patients with radiographic axial spondyloarthritis (r-axSpA) over 52 weeks (wks).

Methods: COAST-V and COAST-W were Phase 3 randomized controlled trials that evaluated efficacy and safety of IXE in biologic DMARD-naïve and tumor necrosis factor inhibitor (TNFi)-experienced patients with r-axSpA, respectively. Patients were randomized to a 160mg or 80mg starting dose of IXE once every 2 wks (IXEQ2W), once every 4 wks (IXEQ4W), active reference arm (adalimumab 40mg [ADAQ2W]) in COAST-V only or placebo up to Wk16. Patients initially randomized to IXE continued the same regimen up to Wk52. Patients on placebo were re-randomized after a 160mg starting dose to either IXEQ2W or IXEQ4W at Wk16. After 6-wk washout period, patients on ADA switched to either IXEQ2W or IXEQ4W and received their first IXE dose at Wk20. Fatigue Numeric Rating Scale (NRS,0-10) and Jenkins Sleep Evaluation Questionnaire (JSEQ,0-20) data were collected at baseline, Wks8,16,36&52. Patient global assessments of disease activity (PGA,0-10), spinal pain and spinal pain at night (0-10) were collected at baseline and each post-baseline visit to Wk52. Mean changes from baseline up to Wk16 were analyzed using mixed effects model of repeated measures. After Wk16, changes from baseline during dose double-blind extended period were summarized as raw means after imputing the missing data using modified Baseline Observation Carried Forward.

Results: At Wk16, IXE showed significant improvements that sustained at Wk52, and continued to improve a fatigue NRS (COAST-V, mean[SD]: -2.8[2.7] with IXEQ4W and -2.6[2.6] with IXEQ2W; COAST-W: -2.8[2.5] with IXEQ4W and -2.0[2.7] with IXEQ2W), PGA (COAST-V: -3.2[2.8] with IXEQ4W and -3.4[2.5] with IXEQ2W; COAST-W: -3.0[2.8] with IXEQ4W and -2.6[2.8] with IXEQ2W), spinal pain (COAST-V: -3.8[2.7] with IXEQ4W and -3.7[2.5] with IXEQ2W; COAST-W: -3.1[2.7] with IXEQ4W and -2.8[2.7] with IXEQ2W) and sleep (COAST-V: -2.2[4.3] with IXEQ4W and -3.7[4.6] with IXEQ2W; COAST-W: -3.8[5.9] with IXEQ4W and -2.7[5.5] with IXEQ2W). Significant reductions in fatigue and spinal pain at night were reported as early as Wk8 and Wk1, respectively, when those were first assessed in patients treated with IXE compared with placebo. Improvements in these parameters at Wk16 with both IXE arms were sustained up to Wk52.

Conclusion: Treatment with ixekizumab resulted in improvements in fatigue, spinal pain at night and sleeping over 52 wks in As/r-axSpA patients who were either bio-naïve or TNFi-experienced.

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" A Joint Clinic: Implementation and Experiences from the First Year of a Novel Combined Rheumatology and Gastroenterology Clinic"

Sarah Oberholtzer (University of Saskatchewan, Saskatoon); Jodie Reis (University of Saskatoon, Saskatoon); Vanessa Rininsland (University of Saskatchewan, Saskatoon); Sharyle Fowler (University of Saskatchewan, Saskatoon)

Objectives: Articular problems affect patients with gastrointestinal issues. Likewise, patients with rheumatic conditions can suffer from gastrointestinal issues including but not limited to dysmotility, inflammatory bowel disease, liver dysfunction, absorption issues, etc. Issues may be the result of a common inflammatory disease process or the result of separate processes. Patients who suffer from both rheumatic and gastrointestinal issues can float between the two specialties without a definitive diagnosis or united approach to management of their condition(s). Our group determined there was a need for a joint rheumatology/gastroenterology clinic.1 In order to improve the care of these complex patients we implemented this clinic and report our experience during the first year.

Methods: The clinic is run once a month by a consultant rheumatologist (CR) and consultant gastroenterologist (CG) with a nurse who acts as the patient liaison and educator. Patients are referred by any physician, in Saskatchewan, who feels the patient may benefit. Each patient is given a thirty-minute appointment where the CR, CG, and nurse are all present. This allows for assessment of issues, discussion, and united treatment planning. The patient is given a copy of the consultation with an outline of the management plan and decides whether to be followed in the clinic or sent back to their individual specialist. Our nurse then phones the patient in the coming days to ensure all issues were addressed. All patients attending the clinic are invited to complete a satisfaction questionnaire and give feedback

Results: During the first year of this novel clinic, fifty-four new patients were referred to and assessed in the combined clinic. We present our teams experience operating the clinic, patient demographics, the range of clinical problems encountered, and the results of patient satisfaction questionnaires.

Conclusion: Combined clinics are a novel approach to improving patient care. To the best of our knowledge our combined rheumatology/gastroenterology clinic is the first of its kind in Canada. All patients have been satisfied with their appointments and have found the clinic of benefit. Feedback has been extremely positive and includes suggestions on how to further improve the clinic. Other advantages include early diagnosis, efficiency of patient care, reducing appointment and travel burden, and continued education. 1. Rininsland V, Oberholtzer S, Reis J. A "Joint Clinic": Developing An Interdisciplinary Rheumatology And Gastroenterology Clinic For Patients With Inflammatory Bowel Disease And Associated Arthropathy. Poster session presented at 2019 Canadian Rheumatology Association Meeting; 2019 March; Montreal, Canada.

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More Biologics, More Problems? Dual Biologic Therapy in Inflammatory Bowel Disease Arthropathy: A Single Centre Experience

Vanessa Rininsland (University of Saskatchewan, Saskatoon); Jodie Reis (University of Saskatoon, Saskatoon)

Objectives: Arthritis is a common extra-intestinal manifestation of inflammatory bowel disease. Tumour necrosis factor inhibitors (TNFIs) are generally effective treatment for both joint and bowel symptoms, however, therapeutic dilemmas occur when bowel symptoms are controlled but joints are flaring or vice versa. This is particularly a challenge with vedolizumab, a gut specific biologic that is often successful at treating refractory bowel inflammation but has no effect on joints, which can result in a joint flare. At this point the addition of another therapy, potentially a second biologic, must be considered. However, the safety of this practice has not yet been elucidated. Our objectives are to evaluate patients seen in the Saskatchewan combined rheumatology-gastroenterology clinic on dual biologic therapy in regards to indication, efficacy and adverse events.

Methods: A retrospective single-centre cohort study was performed assessing patients in the combined rheumatology-gastroenterology clinic on dual biologic therapy. Once identified, patients were evaluated for indication, previous medication history, current clinical status, duration of treatment and adverse effects. Adverse events of particular interest included serious infections.

Results: Three patients at our centre are currently on dual biologic therapy. All patients were initiated on vedolizumab due to refractory Crohn's disease after failure of several TNFIs (mean 3.3). Two of these patients were initiated on a second biologic for uncontrolled joint symptoms. One patient was initiated on secukinumab, which led to resolution of joint symptoms with ongoing bowel remission. The second patient trialed multiple biologics prior to sustained joint remission with tofacitinib. A third patient was initiated on infliximab for control of bowel symptoms with secondary improvement of joint symptoms. Mean duration of dual therapy in these patients is two years. To date no adverse events have been seen. This is

in line with other case reports in which vedolizumab has been combined with other biologics for control of either bowel or joint symptoms without significant increase in adverse events (Ribaldone, et al., 2019).

Conclusion: In patients with severe and refractory Crohn's disease, vedolizumab is a promising option. When these patients have concomitant arthropathy, particularly with axial involvement, clinicians may find themselves pushed to consider dual biologic therapy. Our case series shows a trend towards efficacy and safety in a select patient population. However, more research is needed before we can confidently adopt this as standard practice. As biologic therapy for multiorgan autoimmune diseases becomes more targeted, we anticipate this will become a more prominent issue.

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Impact of Gender and Age on Ankylosing Spondylitis Patient Profiles at Golimumab Initiation and 12-Month Outcomes

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Objectives: Gender and age have been previously identified as independent predictors of response to anti-TNFs. The aim of this analysis was to compare, between genders and age groups, the profile and outcomes of ankylosing spondylitis (AS) patients treated with golimumab during routine Canadian care.

Methods: This is a post-hoc analysis of data from the Biologic Treatment Registry Across Canada (BioTRAC). Patients with AS who initiated treatment with subcutaneous golimumab were included. Patients were grouped into age tertiles (Young: 18.5–39.1 years; Middle: 39.2–51.2; Old: 51.3–90.2) and further stratified by gender. The impact of age and gender on outcomes (ASDAS clinically important improvement [CII; $\Delta \geq 1.1$], major improvement [MI; $\Delta \geq 2.0$], and HAQ < 0.5) and treatment retention were assessed with multivariate logistic and cox regressions, respectively, adjusting for age tertile, gender, HLA-B27 and respective outcome at baseline.

Results: 421 patients were included with a mean (SD) age of 45.7 (13.3) years and disease duration of 6.0 (10.1) years. Across age tertiles, significant differences (p < 0.05) were observed at baseline in disease duration, employment status, insurance coverage, previous smoking status, number of previous DMARDs, previous use of NSAIDs or MTX, concomitant use of DMARDs or oral steroids, and BASFI. Gender, RF status, anti-CPP status, family history, current smoking status, previous use of DMARDs or oral steroids, experience with biologics, concomitant NSAIDs or MTX, ASDAS, BASDAI, HAQ, enthesitis, and dactylitis were comparable. Between genders, significant differences were observed in weight, current/previous smoking status, and BASDAI. Based on multivariate regression, patients in Young age tertile vs. Old were more likely to achieve ASDAS-MI at 12 months (OR [95% CI]: 3.53 [1.00–12.41]) and HAQ < 0.5 at both 6 (2.84 [1.37–5.89]) and 12 (2.63 [1.22–5.70]) months. Achievement of ASDAS-MI at 12 months was also more likely among male patients (4.16 [1.31–13.23]). There was no impact of gender or age tertiles on ASDAS-CII achievement. With respect to treatment retention, male patients were more likely to stay on golimumab treatment (HR [95%]: 2.32 [1.11-4.76]). However, age tertile was not associated with retention. Across age tertiles, AE incidence was comparable; however, SAE incidence was substantially higher among older patients. Between genders, AE incidence was lower among males, with no differences in SAE incidence.

Conclusion: Significant variations in baseline characteristics, treatment outcomes, and safety profile exist across age groups and gender.

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Impact of Region and Registry Site Size on Ankylosing Spondylitis Patient Profile at Golimumab Initiation and 12-Month Outcomes

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Objectives: Access to care and management of AS patients may differ based on Canadian region and extent of physician familiarization with treatments. This analysis aimed at comparing the profile and outcomes of AS patients treated with subcutaneous golimumab in real-world across Canada and biologic treatment registry sites of different sizes.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients initiating treatment for AS with golimumab were included. Provinces were regrouped by region. Based on the tertile distribution of the number of golimumab-treated AS patients enrolled in BioTRAC, sites were classified as; low enrolling: 1-7 patients; medium enrolling: 8-23 patients; high enrolling > 23 patients. Logistic and cox regressions were used to assess the impact of region and site size on outcomes (ASDAS clinically important [$\Delta \geq 1.1$] and major [$\Delta \geq 2.0$] improvements, HAQ < 0.5) and treatment retention while adjusting for age, gender, and baseline levels.

Results: 421 patients were included with a mean (SD) age of 45.7 (13.3) years and disease duration of 6.0 (10.1) years without significant differences between regions or site sizes. Across regions, significant differences were observed in insurance coverage (p < 0.001), previous biologic exposure (p = 0.010), number of prior DMARDs (p < 0.019), and enthesitis (p < 0.001). Across site sizes, significant differences were observed in health insurance type (p < 0.001), previous biologic exposure (p = 0.036), concomitant use of oral steroids (p = 0.008), enthesitis (p = 0.003), and dactylitis (p = 0.007). In multivariate analysis, patients from Maritimes (OR [95%CI]: 0.18 [0.04-0.83]), Ontario (0.18 [0.05-0.57]), and Quebec (0.18 [0.05-0.67]) were less likely to achieve HAQ < 0.5 CDAI at 12 months compared to Western Canada. Furthermore, patients from high enrolling sites were more likely to achieve HAQ < 0.5 at 6 months (2.37 [1.05-5.37]) compared to low enrolling sites. In terms of treatment retention, patients from medium enrolling sites were more likely to stay on golimumab treatment (HR [95%CI]: 1.56 [1.04-2.33]) for a longer period compared to low enrolling sites. A statistical trend (p = 0.115) towards higher retention on treatment was observed in patients from Quebec compared to patients from Western Canada (1.66 [0.88-3.13]). Differences in overall AE, but not SAE, incidences were observed between Canadian regions (highest in Quebec and Western Canada) and site sizes (highest in high enrolling sites).

Conclusion: These results indicate that significant regional variation in baseline characteristics of AS patients, patient management, and outcomes exist within this registry. In addition, patients from higher enrolling sites may experience improved outcomes.

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Frequency and Determinants of Delayed Start of Golimumab Therapy in Ankylosing Spondylitis Patients and Impact on Outcomes

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Objectives: Biologic initiation by Ankylosing Spondylitis (AS) patients followed in routine clinical care is often delayed due to unfamiliarity with utilization management criteria and lag in prescription filling, which could lead to suboptimal treatment outcomes. This analysis aimed at describing the time elapsing between prescription and injection of golimumab treatment in Canadian real-world, identifying patient and physician determinants of such delays, and assessing the potential impact on treatment outcomes.

Methods: This is a post-hoc analysis of data from the BioTRAC registry.

Patients initiating treatment for AS with subcutaneous golimumab were included. Predictors of delayed administration were explored among clinic (region: Western [Alberta, British Columbia, Saskatchewan], Ontario, Quebec and Maritimes; location: rural vs. urban) and patient (age tertiles, gender, disease duration tertiles, ASDAS tertiles, prior biologic experience, and type of insurance coverage [private vs. public vs. other]) characteristics using the independent-samples median test and multivariate generalized linear models. The impact of injection delays on outcomes (ASDAS clinically important [$\Delta \geq 1.1$] and major [$\Delta \geq 2.0$] improvements, HAQ < 0.5) was assessed with logistic regression adjusting for age, gender, and baseline levels.

Results: 421 patients were included with a mean (SD) age of 45.7 (13.3) years and disease duration of 6.0 (10.1) years, and the majority being bio-naive (82.7%) and seen in urban areas (94.5%). Median time to first golimumab injection from baseline was 4.0 weeks (interquartile range: 4.7) with 124 (29.5%) of patients experiencing no delay (zero days). In univariate analysis, median time to first injection was significantly shorter (p = 0.016) in bio-naive patients (2.8 weeks) compared to bio-experienced (4.3 weeks), and in Quebec (0.4 weeks) compared to other regions (4-4.3 weeks) (p = 0.001); no differences were observed across age tertiles (p = 0.425), gender (p = 0.109), disease duration tertiles (p = 0.573), ASDAS tertiles (p = 0.884), site location (p = 0.438), and type of insurance coverage (p = 0.882). In multivariate analysis, upon mutual adjustment, baseline disease duration was identified as the single significant independent predictor of delayed golimumab administration with patients in the lowest disease duration tertile showing the shortest time to first injection (2.1 weeks vs. 3.9 weeks in mid-tertile vs. 5.5 weeks in high tertile). No significant impact on outcomes was observed.

Conclusion: These results indicate that delays exist among AS patients in the first dose of golimumab following prescription in bio-naïve patients and in Quebec.

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Predictors of Response, Adverse Events and Treatment Retention in Ankylosing Spondylitis Patients Treated with Golimumab in a Prospective, Observational Registry

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Objectives: BioTRAC was a prospective, observational registry that enrolled ankylosing spondylitis (AS) patients treated with subcutaneous golimumab (GLM) between 2010 and 2017.

Methods: Patient visits occurred at baseline and every 6 months thereafter. Multivariate logistic regression was used to identify independent predictors of achieving specific efficacy and safety endpoints and included the following covariates: age, gender, disease duration, enrolment period, concomitant medication, smoking and employment.

Results: A total of 421 patients were enrolled and followed for a mean duration of 1.6 years. The proportion of male gender was 59.1% and the mean disease duration at baseline was 6.0 years. Most patients were Bio-naive (> 82%). ASDAS clinically important improvement was more likely to be achieved with higher baseline ASDAS-CRP score [OR (95%): 2.28 (1.51–3.45); p < 0.001], however less likely in patients with baseline concomitant DMARD use [0.31 (0.12–0.80); p = 0.015]. ASDAS major improvement was more likely to be achieved with lower age [OR (95%): 0.94 (0.91–0.97); p < 0.001], higher baseline ASDAS-CRP score [OR (95%): 2.93 (1.80–4.75); p < 0.001], and higher baseline CRP levels [1.04 (1.00–1.07); p = 0.025]. ASAS partial remission was more likely to be achieved with lower age [OR (95%): 0.97 (0.94–0.99); p = 0.013], male vs. female gender [OR (95%): 2.22 (1.10–4.48); p = 0.025], lower baseline ASDAS-CRP [0.67 (0.48–0.94); p = 0.020], and higher baseline CRP

levels [1.01 (1.00–1.02); p = 0.048]. AEs were more likely to occur with older age [1.02 (1.00–1.05); p = 0.024] and concomitant DMARD use [3.03 (1.17–7.85); p = 0.022], yet less likely in patients who enrolled later [2016–2017 vs. 2010–2012: 0.36 (0.15–0.85); p = 0.019]. SAEs were also less likely to occur in patients who enrolled later [2013–2015 vs. 2010–2012: 0.29 (0.10–0.84); p = 0.023 and 2016–2017 vs. 2010–2012: 0.15 (0.03–0.64); p = 0.010]. Increased treatment retention for AS patients treated with GLM were significantly associated with earlier enrolment period (2010-2012 vs. 2016-2017: HR [95% CI]: 0.51 [0.29–0.89], p = 0.017; 2013-2015 vs. 2016-2017: 0.65 [0.44–0.95], p = 0.027), and male gender [0.49 (0.35–0.68); p < 0.001].

Conclusion: Male patients were more likely to achieve a positive treatment response and sustained treatment persistence. Baseline concomitant DMARDs was associated with a lower treatment response, possibly through its association with more complex non-axial disease. Later enrolment period was associated with a lower risk of experiencing an AE but with a higher risk of early treatment discontinuation, possibly driven by the greater availability of alternative therapies.

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Enhanced Performance of the ASAS Classification Criteria by Deletion of Non-Discriminatory Clinical items: Data from the Screening in Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis Cohort

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Objectives: The ASAS classification criteria for axial spondyloarthritis (axSpA) have overall sensitivity/specificity of 82.9%/84.4% but component imaging and clinical arms differ in performance (66.2%/97.3% and 56.6%/83.3%, respectively). We aimed to demonstrate that a data-driven elimination of SpA clinical features that were non-discriminatory in comparisons of patients diagnosed with and without axSpA in a prospective cohort of unselected patients with undiagnosed back pain could enhance the performance of the criteria.

Methods: We used data from the prospective multicenter Screening for Axial Spondyloarthritis in Psoriasis, Iritis, and Colitis (SASPIC) Study, which is aimed at early detection of axial SpA in patients referred by the respective specialist after first presenting with these disorders. Consecutive patients ≤ 45 years of age with ≥ 3 months undiagnosed back pain with any one of psoriasis, AAU, or colitis undergo routine clinical evaluation by a rheumatologist for axial SpA and MRI evaluation is ordered per rheumatologist decision. The rheumatologist determines the presence or absence of axial SpA and the degree of confidence in the diagnosis. Imaging was assessed by central readers. Univariable and multivariable logistic regression analysis was performed to determine which clinical SpA features were/were not discriminatory for the final diagnosis of axSpA. We then compared the sensitivity and specificity of the ASAS criteria with and without these features.

Results: A total of 246 patients were recruited, 47.6% being diagnosed with axSpA (61.5% male, age 33.7 years, symptom duration 7.6 years, B27 positive 52.1%). The following clinical SpA features were non-discriminatory between axSpA/not axSpA: NSAID response, family history of SpA, heel enthesitis, peripheral arthritis, dactylitis. Specificity of the clinical arm and the overall criteria increased from 82.2% to 86.8% without impacting sensitivity.

This effect was particularly noteworthy in patients with lower degree of symptomatology (back pain severity < 5/10, specificity increases from 76.7% to 90.7%), short symptom duration (< 5 years, specificity increases from 78% to 84.7%), and in females (specificity increases from 80.6% to 86.1%).

Conclusion: In a prospective cohort with a high pre-test probability of axSpA certain clinical SpA features were not helpful in discriminating a diagnosis of SpA from not-SpA. Deletion of these features from the list of SpA features used in the ASAS classification criteria enhanced the performance of the criteria, especially in female patients and those with early disease.

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TNF Inhibitors Reduce Spinal Radiographic Progression in Axial Spondyloarthritis by Mechanisms Associated With but Also Independent of Disease Activity

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Objectives: Resolution on the controversial effect of TNFi on structural progression in radiographic axSpA has yet to be achieved. We aimed to investigate whether in r-axSpA TNFi have an indirect (through ASDAS) and/or direct effect on spinal radiographic progression.

Methods: Patients (pts) fulfilling the modified New York criteria (mNY) were included in this prospective cohort (ALBERTA FORCAST). Clinical and imaging data were collected at baseline and every 2 years up to 10 years of follow-up. Radiographs of the spine were scored by 2 central readers and one adjudicator using the modified Stoke Ankylosing Spondylitis Spine Score (mSASSS). The indirect effect of TNFi on mSASSS progression was evaluated by testing the interaction between TNFi and ASDAS at the start of each 2-year interval (t). If significant (p < 0.15) the association between ASDAS at t and mSASSS at the end of the interval (t+1) was assessed in 3 groups of exposure to TNFi: i. treatment in all visits; ii. treatment in some visits and iii. Never treated. The direct effect of TNFi on mSASSS progression was evaluated by testing the association between TNFi at t and mSASSS at t+1 (adjusting for ASDAS at t). Multivariable GEE models adjusted for mSASSS at t (autoregression) and for a set of potential confounders defined a priori on clinical grounds.

Results: In total, 314 pts were included [74% males, mean symptom duration 17.8 (SD 11.7) years, 83% HLA-B27 positive]. The interaction between ASDAS and TNFi at t was significant (p = 0.10). A gradient was seen for the effect of ASDAS at t on mSASSS at t+1, which was more than 2 times higher in patients never treated with TNFi (β (95% CI): 0.41 (0.13; 0.68) compared to those always treated [β (95% CI): 0.16 (0.00; 0.31)], showing that treatment with TNFi diminishes the effect of ASDAS on mSASSS. In addition to the indirect effect, TNFi also directly associated with less mSASSS progression: Pts receiving TNFi at t had on average 0.87 mSASSS-units less on t+1 compared to those not treated [β (95% CI): -0.85 (-1.35; -0.35)] and this was noted independently of ASDAS. Importantly, this effect remained significant after Propensity Score -adjustment [β (95% CI): -0.80 (-1.37; -0.22)].

Conclusion: Treatment with TNFi limits radiographic progression in r-axSpA only partially by decreasing disease activity. A direct effect of TNFi in reducing progression, and independent of ASDAS inflammation, is also seen suggesting that other mechanisms also contribute to structural modification by TNFi.

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Higher Disease Activity is Associated With More Spinal Radiographic Progression in Patients With Axial Spondyloarthritis Independently of Prior Exposure to TNF Inhibitors

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Objectives: The association between disease activity and spinal radiographic progression in radiographic axial spondyloarthritis (r-axSpA) has been previously shown in a cohort of patients (pts) not being treated with TNF inhibitors (TNFi) (OASIS). We aimed to test the possible association between disease activity and spinal radiographic progression in r-axSpA in a real-life cohort, also including patients treated with TNFi.

Methods: Pts with axial spondyloarthritis (axSpA) fulfilling the modified New York criteria (mNY) were included in this prospective, observational cohort (ALBERTA FORCAST). Clinical and imaging data were collected at baseline and every 2 years up to 10 years of follow-up. Radiographs of the spine were independently scored by 2 central readers and one adjudicator (if disagreement), with known chronological order but blinded to clinical data, using the modified Stoke Ankylosing Spondylitis Spine Score (mSASSS). To be included, pts had to have ≥ one 2-year interval with data on mSASSS from ≥1 reader available as well as complete data on ASDAS and TNFi exposure at the start of the interval. The association between ASDAS at the start of the interval (t) and mSASSS 2 years later (t+1) was tested in two types of longitudinal GEE models: i. multilevel (2 readers) model with the individual reader scores as outcome (2-level models); ii. Using as outcome averaged scores between readers (1-level models). Both type of models were adjusted for mSASSS at t (autoregression) and for a set of potential confounders defined a priori on clinical grounds.

Results: In total, 314 pts (442 intervals) were included [74% males, mean symptom duration 17.8 (SD 11.7) years, 83% HLA-B27 positive and 7% previously treated with ≥1 TNFi]. At baseline the mean ASDAS was 2.7 (1.3) and the mean mSASSS 13.8 (18.9). During follow-up 213 (68%) pts received treatment with TNFi in ≥1 visit. Overall, the average 2-year progression was 1.33 (2.68) mSASSS-units per 2-year interval. In the 2-level multivariable model, 1 ASDAS-unit increase at t was associated with an increase of 0.25 mSASSS-units at t+1 [β (95% CI): 0.25 (95%CI 0.10; 0.41)].Results were similar using the averaged mSASSS as the outcome [β (95% CI): 0.25 (0.08; 0.43)].

Conclusion: These data indicate that a higher ASDAS is associated with higher spinal radiographic progression in pts with r-axSpA and this is independent of prior treatment with TNFi. Top 10 Poster

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Application of Treat to Target and Impact of Sustained Low Disease Activity or Remission on Function in Ankylosing Spondylitis Patients

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Objectives: Previous analyses have identified enrolment year as an independent predictor of retention on anti-TNF treatment whereby patients enrolled in later periods were more likely to be switched. The aim of this analysis was to compare between enrolment periods for ankylosing spondylitis (AS) treatment outcomes and frequency of treating to target, and to assess the impact of target type on long-term function.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients with AS who initiated treatment with infliximab or subcutaneous golimumab were included. Patients were grouped into enrolment periods: 2006-2008, 2009-2012, 2013-2015, 2016-2017. Achievement of LDA (ASDAS < 2.1), remission (ASDAS < 1.3), and sustained LDA or

remission (at 6 and 12 months) were compared between enrolment periods with the Chi-square test and multivariate logistic regression. The impact of achieving LDA or remission at 6 months, 12 months, or both (sustained) on BASFI at 18 months was assessed with one-way ANOVA and generalized linear models.

Results: 810 AS patients treated with anti-TNFs (IFX: n = 389; GLM: n = 421) were included. Over calendar time, a significant decrease in baseline disease duration and disease activity scores (ASDAS, BASFI) was observed (p < 0.001). At 6 and 12 months, 37.6% and 40.2% achieved LDA, 19.2% and 22.9% achieved remission, while 24.7% and 13.4% achieved sustained LDA and remission, respectively without significant differences across enrolment periods. Among patients not achieving LDA at 6 and 12 months, an intervention was applied in approximately 40% of patients, at gradually increasing rates across enrolment periods (p < 0.05). Between 6 and 12 months, the most common intervention was anti-TNF discontinuation (55.1% of non-LDA achievers), followed by NSAID addition (21.3%), DMARD addition (10.1%), or DMARD dose increase (9.0%). Similar results were obtained post 12 months. Since anti-TNF switch also meant discontinuation from the registry, its impact on outcomes could not be ascertained. Patients achieving sustained LDA, followed by those achieving LDA either at 6 or 12 months had significantly lower BASFI at 18 months compared to patients not achieving LDA at either timepoint (1.5 vs. 3.9 vs. 5.0; p < 0.001). Similar results were observed when evaluating achievement of disease remission albeit with greater impact on BASFI at 18 months (1.3 vs. 2.1 vs. 4.6; p < 0.001). Adjustment for baseline BASFI did not impact the results.

Conclusion: Treating to target among AS patients treated in Canadian real-world has increased over time. Achieving stricter targets was associated with greater benefits in terms of long-term patient function.

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Ixekizumab Is Effective in the Treatment of Radiographic Axial Spondyloarthritis Regardless of the Level of C-Reactive Protein or Magnetic Resonance Imaging Scores

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Objectives: To evaluate response rates at week 16 with ixekizumab (IXE), an IL-17A antagonist, in patients with ankylosing spondylitis (AS)/radiographic axial spondyloarthritis (r-axSpA) and elevated or normal/low inflammation as measured by (C-reactive protein) CRP or spinal magnetic resonance imaging (MRI).

Methods: Two Phase-3, randomized, double-blind, placebo (PBO)-controlled trials (COAST-V and COAST-W) enrolled biologic-naive or tumor necrosis factor inhibitor (TNFi)-experienced patients, respectively. All patients fulfilling Assessment of SpondyloArthritis international Society (ASAS) criteria also fulfilled modified New York criteria for AS. Patients were treated with IXE (80mg every 2 or 4 weeks [Q2W, Q4W]) or PBO; adalimumab (40mg Q2W) was an active reference arm in COAST-V. We examined ASAS 40% (ASAS40) response rates at week 16 for intent-to-treat population by baseline CRP (≤ 5 or > 5 mg/L) and/or MRI spine inflammation (Spondyloarthritis Research Consortium of Canada [SPARCC] spine score < 2 or ≥ 2). Baseline spine MRI (scored by central readers) was available in 96% of patients in COAST-V and 51% in COAST-W. Higher scores reflect greater baseline disease activity. Missing data for ASAS40 were imputed by nonresponder imputation.

Results: In the COAST-V/W integrated dataset that combined biologic-naive and TNFi-experienced populations, significantly more patients treated with IXE achieved ASAS40 response at week 16 versus PBO in the elevated (> 5mg/L) baseline CRP group (39.3%, 42.5%, and 16.7%

for IXEQ4W, IXEQ2W, and PBO, respectively; p < .001 for IXEQ4W, IXEQ2W vs PBO) and in the normal (≤ 5mg/L) baseline CRP group (27.4%, 35.2%, and 12.3% for IXEQ4W, IXEQ2W, and PBO, respectively; p < .05 for IXEQ4W, p < .01 for IXEQ2W vs PBO), and the magnitude of response with IXE between elevated versus normal CRP groups was not statistically significant. Notably, a significantly higher proportion of patients achieved ASAS40 at week 16 with IXE versus PBO, regardless of whether MRI spine SPARCC scores were < 2 (40%, 51.7%, and 15.5% for IXEQ4W, IXEQ2W, and PBO, respectively; p < .01 for IXEQ4W, p < .001 for IXEQ2W vs PBO) or ≥ 2 (44.3%, 46.6%, and 18.7% for IXEQ4W, IXEQ2W, and PBO, respectively; p < .001 for IXEQ4W, IXEQ2W vs PBO). Among patients (n = 79) with MRI spine SPARCC score < 2 and CRP ≤ 5mg/L, ASAS40 responses at week 16 were 13%, 29%, and 48% for PBO, IXEQ4W, and IXEQ2W, respectively, with statistically significantly greater improvement for IXEQ2W vs PBO (p < .05).

Conclusion: Based on integrated data, ixekizumab demonstrated efficacy (ASAS40 response) in AS/r-axSpA treatment at week 16 even in the absence of an elevated CRP or evidence of spinal inflammation on MRI at baseline.

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Sacroiliitis and Spondyloarthritis in Patients with Giant Cell Arteritis - More than a Chance Occurrence

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Objectives: Giant Cell Arteritis (GCA), a large vessel vasculitis (LVV), typically involves the large blood vessels of individuals > 50 years old. Conversely, SpondyloArthritis (SpA) typically affects axial and peripheral joints most commonly in young males. While overlap of these pathologies would be unexpected, there are limited data showing a possible association between LVV and SpA. We report a series of six patients with GCA who were incidentally found to have sacroiliitis.

Methods: We performed a retrospective chart review of patients with GCA (ACR criteria) with incidentally noted signs of SpA/sacroiliitis from 2010-2018. Demographics, clinical markers, investigations, and treatment were extracted. SpA diagnosis was based on Assessment of Spondylo-Arthritis international Society (ASAS) criteria. Patients < 50 years were excluded to prevent potential overlap with Takayasu Arteritis. Imaging for sacroiliitis and GCA was read by two independent radiologists.

Results: Of 6 patients with GCA, only one fulfilled all ASAS criteria. However, had age and pain been removed from entry criteria, all would have fulfilled it. Regarding GCA diagnosis, 3/6 patients initially presented with visual symptoms. Notably, 3/6 (2/3 with visual symptoms) initially showed signs of PMR. Of 5 patients with relevant imaging, 3 had GCA vascular findings involving the aortic branches. Only 2 patients exhibited inflammatory back pain; the remainder had sacroiliitis based on incidental findings. No patient had any physical finding suggestive of peripheral arthritis. There was no specific pattern of radiologic peripheral joint involvement. Of 3 patients who had a HLAB27 performed, one was positive. ESR/CRP were significantly elevated in all patients. Management was directed at GCA treatment. As expected, the mainstay was steroids in 5/6 patients; 2 patients required DMARDs. Mean (SD) time to remission was 7.6 (4.7) months. Two of 6 patients who initially presented with PMR also required long-term low-dose steroids to sustain clinical remission. No patient required an NSAID or biologic to treat their sacroiliitis.

Conclusion: Our series shows that a potential rare yet unique subset of GCA patients who present with sacroiliitis/SpA. Despite a small sample size, potential unique characteristics include associated PMR, large vessel GCA and subclinical aortic involvement. This possible link warrants further research particularly given the atypical older age of sacroiliitis diagnosis in these patients. Future investigations involve analyses of large

databases that include a GCA control population as a comparator to determine the prevalence and clinical characteristics in GCA patients presenting with sacroiliitis/SpA and any possible targeted treatment options.

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Patient Characteristics and Referral Patterns of Patients Enrolled in a Multi-disciplinary Glucocorticoid-induced Osteoporosis Prevention and Treatment Clinic

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Objectives: Numerous studies have shown suboptimal bone health treatment of patients on long term glucocorticoids. A new multi-disciplinary GIOP prevention and treatment clinic was created at the University of Alberta Hospital in January 2016 with the intention of meeting this treatment gap. This study reports the patient characteristics and referral patterns of patients seen in this clinic.

Methods: All GIOP patients seen in this clinic were prospectively entered into a Redcap database which included patient demographics, referral patterns, glucocorticoid history, osteoporosis risk factors, fracture history, DXA scan results, medication history and recommendations. Patient data was collected on all initial and follow-up visits. Data was extracted and analyzed using summary statistics

Results: 223 patients were seen from January 2016 to September 2019. Average age of patients was 56 years with a majority being female (53%). The majority of patients were referred to the clinic by other specialists including rheumatologists (27%) and nephrologists (23%), with the remainder of specialist referrals coming from oncologists, ophthalmologists, hematologists and pulmonologists, and 6% coming from family doctors. Patients were exposed to an average cumulative dose of 5.663 g of prednisone equivalent over the 2 years prior to initial clinic visit. There was a total of 58 fragility fractures, corresponding to 0.3 fractures per patient. 45% of patients were on osteoporosis medication at the time of the first clinic visit and 42% had DXA scans prior to referral. FRAX score distribution was as follows: Low (50%), moderate (30%), high (20%). The clinic recommended starting medications for bone health in 35% of patients, continuing medications in 37%, switching medications in 4% and stopping medications in 5% of patients.

Conclusion: Most patients seen at this tertiary centre GIOP prevention and treatment clinic were referred by a specialist. Despite patients having exposure to high cumulative amounts of glucocorticoids and many having had fragility fractures, most were not on osteoporosis medication. These results reiterate how high risk these patients are for fragility fractures and support the importance of targeted bone health interventions for patients on long-term glucocorticoids, such as specialized GIOP clinics.

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A Rare Cause of a Common Disease: Myelodysplastic Syndrome Associated Calcium Pyrophosphate Crystal Polyarthritis. A Case Report and Review of the Literature

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Background: Myelodysplastic syndromes (MDS) comprise a heterogeneous group of malignant hematopoietic stem cell disorders characterized by dysplastic and ineffective blood cell production. Of patients diagnosed with MDS, approximately 10 to 20% will manifest autoimmune disorders with a variety of presentations including that of a seronegative, symmetric, poly-articular inflammatory arthritis (1). Herein, we report a case of treatment resistant MDS-associated calcium pyrophosphate deposition disease (CPPD).

Case Presentation: An 81-year-old male with no prior rheumatologic history presented to hospital with inability to ambulate secondary to an acute oligoarthritis involving his bilateral knees and ankles. He was incidentally noted to have a macrocytic anemia, with subsequent work-up including a bone marrow biopsy revealing a new diagnosis of myelodysplastic syndrome. He was initially managed with empiric antibiotics for septic arthritis because of fevers and synovial fluid aspirate of the knee showing 30,000 WBC's. Antibiotics were stopped when subsequent blood and synovial fluid cultures were negative and showed calcium pyrophosphate crystals. Following this, he received an intra-articular corticosteroid injection to his left knee along with ACTH for likely pseudogout, however he had no response to therapy and indeed progressed to a polyarticular arthritis involving his bilateral sternoclavicular joints, elbows, wrists, knees, and ankles. His serology was sent which was negative for rheumatoid factor, anti-CCP, and ANA. He was initiated on prednisone 20mg daily with no improvement. A work-up for secondary causes of CPPD was negative apart from MDS. He underwent a repeat arthrocentesis of his left knee which again showed CPPD crystals with no growth on cultures. In addition, he developed sudden onset dysphagia requiring G-tube insertion, thought to be secondary to crystal deposition in the cervical spine shown on CT. His steroids were up titrated to prednisone 60mg daily (1mg/kg dose). His polyarthritis slowly improved although his dysphagia remained.

Conclusion: Literature describing CPPD associated polyarthritis in relation to MDS is limited, with only 2 case reports describing a similar presentation with steroid-resistant polyarthritis and CPPD shown on arthrocentesis (2,3). In addition, one such report also details dysphagia and neck pain related to concomitant crystal arthritis in the cervical spine (2). To our knowledge, this is the third case of MDS associated CPPD crystal arthritis reported in the literature and further supports the hypothesis that this represents a new paraneoplastic syndrome.

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Acral Digital Ischemia Associated With Immune Checkpoint Inhibitor Therapy: A Case Series of the Canadian Research Group of Rheumatology in Immuno-oncology (CANRIO) Experience

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Objectives: Immune checkpoint inhibitors (ICIs) are a family of therapeutic agents used in cancer immunotherapy to enhance the anti-tumor immune response. Toxicities secondary to these medications are common, with a wide variety of manifestations affecting nearly every organ system. Recently, acral digital ischemia associated with programmed death-1 (PD-1) inhibitors has been reported in the literature, with five cases described to date. Herein, we report three additional cases of acral digital ischemia that developed in the setting of ICI therapy.

Methods: We report patients identified by Canadian Research Group of Rheumatology in Immuno-Oncology (CanRIO) members between 2017 and 2019 who were diagnosed with acral digital ischemia associated with ICI therapy. Alternative explanations for the presenting syndrome were excluded clinically. Clinical data was extracted by retrospective chart review.

Results: Case 1: A 56 year old female with metastatic serous endometrial adenocarcinoma presented with acral digital necrosis after receiving pembrolizumab in conjunction with lenvatinib 10 days prior. She also developed a concomitant subclinical myositis. She was managed with 1g IV methylprednisolone for 3 days followed by oral prednisone at 1mg/kg/day, immunomodulation with mycophenolate, anti-platelet therapy with aspirin, and vasodilation with amlodipine, topical nitroglycerin paste, and pentoxifylline. Case 2: A 69 year old male with metastatic renal cell carcinoma presented with acral digital ischemia 2 months after starting nivolumab therapy. He was treated with 1 g IV methylprednisolone for 3 days, followed by oral prednisone at 1mg/kg/day, along with vasodilatory therapy with a 5-day infusion of epoprostenol and topical calcium channel

blockers. Upon tapering of his prednisone, he developed recurrence of his digital ischemia requiring prednisone 100mg daily and a second 5-day infusion of epoprostenol. He subsequently improved with introduction of mycophenolate, anti-platelet therapy with clopidogrel, and vasodilatory therapy with topical diltiazem and isosorbide dinitrate, in conjunction with an oral prednisone taper. Case 3: A 63 year old female with metastatic non-small cell lung cancer presented with acral digital ischemia of her fingers after 82 cycles of pembrolizumab therapy over 3 years. She had prior ICI-related inflammatory arthritis and rash. She was managed with oral prednisone at 50mg daily, hydroxychloroquine 300mg daily, vasodilatory therapy with nifedipine, and therapeutic anticoagulation with dalteparin in part due to a prior deep vein thrombosis.

Conclusions: Acral digital ischemia is a rare immune related adverse event associated with ICI therapy. Management strategies to date include a combination of immunosuppression, anti-platelet therapy, and vasodilatory therapy.

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Arthritis and Functional Impairment Compound Nutritional Risk in Older Adults: Findings from the Canadian Longitudinal Study on Aging

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Objectives: Recent evidence suggests that people with arthritis (PWA) have an increased vulnerability to nutritional problems such as malnutrition. It is speculated that functional impairment may contribute to this susceptibility, although this relationship remains understudied. Nutritional risk (NR) screening allows for the early detection of poor nutritional status, thus favouring timely interventions and prevention. This study sought to investigate the association between NR and arthritis and to determine whether functional impairment modified that association.

Methods: We performed a cross-sectional analysis of baseline data from the Canadian Longitudinal Study on Aging (CLSA), a nationally representative sample of 45-85 years-old community-dwelling Canadians adults. Physician-diagnosed arthritis (osteoarthritis, rheumatoid, other types) was self-reported, NR was determined using the validated abbreviated Seniors in the Community: Risk Evaluating for Eating and Nutrition II (SCREEN II-AB) questionnaire, and functional impairment was defined as difficulties performing activities of daily living (ADL) using the Older American Resources and Services (OARS) scale. NR was considered as both a continuous variable (using participants' final SCREEN II-AB score where lower scores indicate greater risk) and binary (using a pre-established SCREEN II-AB cut-off score to identify high NR status). We assessed the association between (1) arthritis and NR score, and (2) arthritis with the odds of high NR status, using multiple linear and logistic regressions, respectively. Analyses adjusted for demographic characteristics (age, sex, personal and household income, education, number of people in the household), ADL impairment, meal-related ADL impairment, and measures of health (weight-status based on self-reported height and weight, self-rated general health, self-rated mental health). Additional analyses stratified the models by ADL impairment. All analyses incorporated the complex sampling design and survey weights.

Results: Respondents numbered 41,153 (Male: 49.7%, Mean age: 59.2). PWA had lower NR scores (beta:-0.36 SE:0.07, p<0.0001) and were more likely to have high NR status (OR:1.12, 95% CI:1.06-1.17, p < 0.0001). This trend remained significant with stratification for ADL impairment: PWA with ADL impairment were 31% more likely to be at high NR (95%CI:1.12-1.53, p = 0.001) while PWA without impairment were 10% more likely to have high NR status (95% CI: 1.04-1.16, p = 0.0006).

Conclusion: Arthritis is associated with high NR in community-dwelling adults over the age of 45 years, both in PWA with and without ADL

impairment. These findings highlight the need for further research on these relationships to inform interventions and improve clinical practices.

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Tick Tock

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Background: A previously well 27-year-old male presented with 3 weeks of chills, fatigue, diffuse rash, severe arthralgias leaving him bedbound. Travel history only revealed exposure to a dog tick while camping which was momentarily attached and not engorged. His family physician diagnosed him with mononucleosis via a positive heterophile (monospot) test. Subsequently, he developed orthostatic presyncope which brought him into the emergency room.

Case Presentation: Examination revealed a pulse of 38, blood pressure 124/52. There was no lymphadenopathy, rash nor synovitis. Investigations including troponins, TSH, RF, ANA were normal. He had an elevated CRP of 52 and ECG showing third degree heart block. Serologies for HIV, Lyme were sent. Echocardiogram revealed enlarged left atrium. Cardiac MR showed subtle myocardial edema. Rheumatologic evaluation yielded no obvious autoimmune condition, but intravenous steroids were started for subtle signs of myocardial inflammation causing profound heart block. Further literature searches revealed that self-limited episodes of heart block were a possible manifestation of Ebstein Barr Virus (EBV) infection, and hence steroids were tapered. The patient improved symptomatically, and ECG improved to first degree heart block which allowed discharge from hospital. He re-presented 2 days later with worsening presyncope and a deterioration back into 3rd degree heart block. At this time, serology from his previous admission returned with positive IgG/IgM for Lyme with a positive confirmatory western blot, and he was thus diagnosed with Lyme carditis. It was determined that his previously positive heterophile testing for mononucleosis likely reflected a false positive reaction to Lyme, which is an immunologic phenomenon previously reported in the literature. He received a temporary pacemaker and 2 weeks of ceftriaxone. His rhythm recovered to sinus over the following weeks.

Conclusion: Our patient illustrates an interesting case of acquired heart block initially concerning for a primarily inflammatory disease, later suspected to be a rare complication of EBV, and finally found to be Lyme Disease. Clinicians should know that heterophile tests can be falsely positive in Lyme, as treatment differs between EBV and Lyme. In an age where providers may be weary of patients self-diagnosed with Lyme, it remains critical to suspect this diagnosis in a patient with new heart block, even if the exposure history was atypical. Finally, the conduction improvement after steroids and relapse upon tapering suggests that cardiac conduction block may reflect the host inflammatory response to the pathogen, and that steroids may be of temporary benefit in severe conduction blocks associated with Lyme disease.

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Rituximab in the Treatment of Opsoclonus Myoclonus Ataxia Syndrome

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Background: A 44-year-old male presented with flu-like symptoms, vertigo, ataxia, twitching of the hands and feet, falls, jerking movements of the eyes, and ultimately became completely bedbound. Initial investigations showed normal CT head, MRI head and spine, lumbar puncture and baseline bloodwork including rheumatoid factor and anti-nuclear antibodies were negative.

Case Presentation: Neurology was consulted and a clinical diagnosis of opsoclonus myoclonus ataxia syndrome (OMAS) was made. OMAS is an extremely rare neuroimmunological condition sometimes triggered by infection or malignancy and thought to be autoantibody mediated. Further investigations including paraneoplastic, infectious and autoimmune

workup, autoantibodies (anti-GAD, Hu, Yo, Ri, Tr, neuronal, a3-AChR and glycine receptor antibodies) were negative. He was initially treated with high-dose solumedrol with subsequent tapering prednisone, along with intravenous immunoglobulin and plasma exchange with minimal effect. Based on support from the pediatric OMAS literature, rituximab was initiated with vasculitic dosing i.e. 375mg/m2 IV weekly for 4 weeks. He received 5 rounds of rituximab separated by 6 months each, which resulted in sustained improvement in opsoclonus, myoclonus, ataxia and fine finger movements. He was successfully tapered off prednisone.

Conclusion: Our case demonstrates that OMAS can be successfully treated with anti-CD 20 therapy; possibly through halting the evolution of early B-cells into long-lived antibody secreting plasmacytes. To our knowledge, this is the first case reporting the use of rituximab in adult OMAS.

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An Unsteady Case: GAD-1 Associated Cerebellar Ataxia

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Background: In 2002, a previously healthy 52-year-old male presented with sudden leg pain, progressive incoordination, and dysarthria. Examination revealed unsteady, wide-based shuffling gait. He had horizontal diplopia on rightward gaze, flattened left nasolabial fold, slight lingual tremor, bilateral dysmetria and dysdiadochokinesia. Pronator drift and Romberg's test were negative. Cognition, sensation, reflexes and strength were preserved.

Case Presentation: Initial work up in the ER and subsequently with neurology revealed normal liver enzymes, CK, LD, IgA-TTG, ceruloplasmin, cryoglobulins, C3, C4, quantitative immunoglobulins, SPEP, ANA, ANCA's, RF, CCP, AMA, ASMA, anti-thyroglobulin antibodies, AChR Ab, 25-OH vitamin D, HBSAg, HCV RNA. MR of brain, lumbar puncture, and electrophysiologic studies were non-contributory. A video swallow study showed aspiration. The working diagnosis was an idiopathic cerebellar syndrome, and managed with physiotherapy. Eight months after the onset of ataxia, the patient developed new type-1 diabetes with low C-peptide < 33 (N > 298). He was referred to Clinical Immunology and Rheumatology in 2008 where further investigations revealed high IgG 18.8, anti-TPO of 90, and anti-glutamic acid decarboxylase (GAD) antibodies >100 (N<1). Repeat MRI of the brain showed cerebellar atrophy. He was diagnosed with anti-GAD associated cerebellar syndrome (GAD-CA) in 2009, 7 years following the onset of first symptoms. He was ultimately treated with high dose IVIG[U6] with partial improvement in gait, dysarthria, balance and overall quality of life.

Conclusion: GAD-CA is an extremely rare disorder, affecting 1-2 per million, and presents with a subacute or chronic course of cerebellar, gait, and oculomotor abnormalities. It is thought that GAD antibodies may be pathogenic, depressing GABAergic synapses in the cerebellum, giving rise to its classic symptoms. Some cases are associated with epilepsy, Stiff Person Syndrome, or other autoimmune manifestations such as type-1 diabetes mellitus, opsoclonus-myoclonus-ataxia, limbic encephalitis, and progressive encephalomyelitis with rigidity and myoclonus. An underlying malignancy is present in 12% of patients. This particular case was unusual, as most present in females, and type-1 diabetes typically precedes the onset of cerebellar ataxia by a median of 8 years. Cerebellar syndromes once deemed 'idiopathic' are increasingly recognized to be autoimmune, sometimes with an associated auto-antibody. Clinicians should have a high index of suspicion for GAD-CA when confronted with an unexplained cerebellar syndrome and concurrent development of other autoimmune manifestations, especially adult onset type 1 diabetes. Treatment is glucocorticoids combined with other immunosuppressants, for which benefit has been described with IVIG, rituximab, mycophenolate, or azathioprine.

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Elevation of Platelet Factor 4 in Systemic Sclerosis

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Objectives: Systemic Sclerosis (SSc) is a chronic progressive disease characterized by inflammation, fibrosis, and vascular dysfunction. Research into vasculopathy has suggested that a cytokine released by plasmacytoid dendritic cells named CXCL4 is elevated in patients with SSc but not in controls. It was associated with fibrosis of skin and lung parenchyma, as well as with pulmonary arterial hypertension. Recently, CXCL4 has also been shown to form immunogenic complexes with DNA which stimulate plasmacytoid dendritic cells to release type 1 interferon in SSc patients. Our pilot study aims to confirm the previous findings of elevated CXCL4 in SSc patients.

Methods: Serum from 25 patients and 20 healthy controls was collected into sodium heparin tubes, and ELISA (using Quantikine ELISA Kit from R&D Systems inc.) was performed within 3 hours to determine CXCL4 levels. T-test was performed to compare PF4 levels. Regression was used to assess differences in PF4 between patients with or without digital ulcers, ILD, and evaluate the association between skin score and PF4.

Results: Of the 25 SSc patients, 23 were female and 2 were male. Patients ranged from age 41-76 years. SSc subtypes included 16 Limited, 6 Diffuse, 2 SSc sine scleroderma, and 1 overlap systemic lupus. All had Raynaud's phenomenon. 20 controls were composed of 18 female and 2 males, age ranging from 35-68. CXCL4 levels were significantly higher in SSc patients (49.2ng/ml) compared to controls (27.2ng/ml) (p = 0.0009). Patients with digital pits had higher PF4 levels (56ng/ml) compared to controls (40.2ng/ml). PF4 was not associated with ILD nor with skin score.

Conclusion: Here we demonstrate a clear difference in CXCL4 levels between SSc patients and controls. PF4 levels were also higher in patients with digital pits, raising the question of its possible role in vasculopathy and microthromboses. These preliminary findings form the basis for further studies in pathogenesis and therapeutic interventions in SSc.

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Exploring the Vocational Needs of Young People with Juvenile Idiopathic Arthritis and the Provision of Rehabilitation Services in Transition Care

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Objectives: To explore the vocational needs in transition care from pediatric to adult health services from the perspective of young people and adults living with juvenile idiopathic arthritis (JIA), as well as describe the role rehabilitation professionals play in this process.

Methods: A descriptive qualitative study design was used. A convenience sample of 5 young people and adults (18 to 45 years) with JIA who varied in age and disease characteristics and who had received or were receiving rehabilitation services from a Canadian healthcare center or rehabilitation center were recruited. Individual audiotaped interviews lasting 60 to 90 minutes were conducted with each participant by telephone or in person using semi-structured interview guides. Audiotaped findings were transcribed verbatim, sorted, organized and coded using the QDAMiner program software. Data was categorized into emerging themes using simple content analysis. Qualitative findings highlighted the expectations and needs of young people, services received/offered, and the role of the occupational therapist and other rehabilitation professionals in transition care.

Results: Young people and adults with JIA reported a number of obstacles precluding them from fulfilling meaningful and productive vocational activities. Specifically, the following difficulties were identified: making the right career choice, accomplishing work-related tasks despite disease symptoms, meeting work requirements and dealing with work-related absences due to medical appointments. As highlighted by participants, difficulties appearing when transitioning from pediatric to adult healthcare services

were due in large part to their greater responsibility in disease self-manage-ment and the lesser support offered by health care professionals and family members. Those interviewed also mentioned wanting more information about the process, better coordination and planning of transition services towards adult healthcare. A number of participants received occupational therapy services and explained that the interventions received during the transition process focused on improving function and the accomplishment of activities of daily living and for most did not include a comprehensive treatment plan to help optimise participation in meaningful occupations and vocational aspirations.

Conclusion: These preliminary findings highlight how the vocational needs of young people with JIA may still be underserved, specifically in terms of vocational training and employment. Further studies are needed to assess in greater detail the quality of health care and rehabilitation provi-sion in transition care.

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How Antimalarials Adherence Affects the Mortality of Lupus Patients? A Population-based Study

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Objectives: Antimalarials (AM) are considered "lupus life insurance," yet in practice, there is a large variation in patients' adherence to taking them. Our objective was to assess the effect of time-varying AM adherence on mortality among systemic lupus erythematosus (SLE) patients.

Methods: This study used administrative databases of British Columbia, Canada. We constructed an incident SLE cohort between January 01, 1997, and March 31, 2015, utilizing the physician billing data and a 7-year washout period. The inclusion criteria were at least two physician visits, at least two months apart, within two years, with an ICD-9 code (710.0) or ICD-10 code (M32.1, M32.8, M32.9). Follow-up started at the first day of having both SLE and AM, i.e., at the SLE index date (second ICD code) for those whose first AM use occurred before the SLE index date, or the date of the first AM use if otherwise. AM courses were formed from the PharmaNet database by accumulating prescriptions with a gap between two prescrip-tion end dates less than 90 days. For each course, a measure of adherence, the proportion of days covered (PDC), was calculated and categorized as non-adherent (PDC < 0.20), partially adherent ($0.20 \leq$ PDC < 0.90) or fully adherent (PDC $\geq$ 0.90). Our outcome was all-cause mortality, obtained from the vital statistics registry. We used a Cox proportional hazard model to estimate the effect of time-varying AM non-adherence on the risk of death, adjusting for demographics, medications, time-varying hospitaliza-tions, inpatient and rheumatologist visits, and Charlson comorbidity index.

Results: We identified 3261 incident SLE patients (mean age 47.8 years, 2907(89.1%) women) who had at least one AM course. The mean follow-up was 6.6 years. The mean Charlson index score was 1.34, and 740(22.7%) took at least two drugs other than AM at the baseline. Each patient took 2.3 courses on average, with an overall mean course duration of 558 days. Among the incident SLE patients, 274(8.4%) died during the follow-up. The unadjusted and adjusted hazard ratios (HRs) obtained for partially AM adherent SLE patients were 0.60(95% CI: 0.25-1.42) and 1.01 (95% CI: 0.42-2.44), respectively, whereas for AM non-adherent SLE patients the HRs were 5.57(95% CI: 3.15-9.86) and 5.73(95% CI: 2.82-11.65), respec-tively, compared to the fully adherent SLE patients.

Conclusion: After adjusting for observed confounders, the risk of death in SLE patients increased to be 5.73 times for AM non-adherent ones of that for fully AM adherent patients. Our findings support the importance of AM adherence to prevent premature deaths in SLE patients.

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Review of Outpatient Referrals to Rheumatology; Adherence to Choosing Wisely Recommendations Regarding Anti-Nuclear Antibody Testing at the Referral Level

Julie Mongeau (Dalhousie University, Halifax); Trudy Taylor (Dalhousie University, Halifax)

Objectives: Judicious use of antinuclear antibody (ANA) testing has been one of the top 5 Choosing Wisely Canada (CWC) recommendations for Rheumatology. The goal of this study was to determine if physicians are applying this CWC recommendation in daily practice.

Methods: A chart review was conducted on all new outpatient consulta-tions to the Rheumatology clinic in Halifax, Nova Scotia (at the Arthritis Centre) between January 1st, 2016 to June 30th, 2016. Data extracted from each chart includes: pre-consultation ANA testing, indication for testing and ordering physician; any prior ANA testing and results; and post-consul-tation ANA testing and diagnosis.

Results: Out of 1324 new consultations logged, 933 (70%) were identified as new consultations and included in the study. The average patient age was 54, and 70% were female. ANA was done prior to consultation in 485 patients (52%). The most common indication for ANA testing was arthral-gias (n = 330, 65%). Seventy percent (n = 223) of the tests were negative. The second most common indication was back pain (n = 30, 6%). Most ANA tests were ordered by Primary Care (n = 418, 86%), of which 66% (n = 277) were negative. ANA testing was ordered following Rheumatology consultation in 28 patients (3%). Of these, 9 were positive (32%). Of all Primary Care referrals, the most frequent diagnoses include: osteoarthritis (n = 52, 15%), fibromyalgia (n = 31, 9%), musculoskeletal disorders (i.e. rotator cuff tendinopathy; n = 26, 8%), nonspecific arthralgias and chronic back pain (both: n = 17, 5%). Half of all patients had ANA tested previ-ously within the last 2 years (n = 454, 59%). Of all patients with a pre-con-sultation negative ANA, 80% had an ANA test within the past 2 years (n = 252). The most common diagnoses overall include osteoarthritis (n = 146, 16 %) and chronic pain syndromes (n = 132, 14%).

Conclusion: ANA testing is often done pre-Rheumatology consultation. Most ANA testing is ordered in Primary Care. The indications for ANA testing in most cases did not meet CWC recommendations. The most common diagnoses reached were ANA negative disorders. There was a high rate of repeat ANA testing, with prior ANA tests done in 50% of patients, with a higher frequency in patients with a negative ANA. This study highlights an area for improvement. Educational interven-tions, particularly in Primary Care may help reducing inappropriate ANA testing, which would reduce cost to the healthcare system, and unnec-essary Rheumatology referrals. Top 10 Poster and Best Abstract by a Rheumatology Resident Award.

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Impact of Waiting Time for Multidisciplinary Pain Treatment on the Quality of Life of Persons With Rheumatic Conditions

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Objectives: One in four persons with rheumatic conditions suffer from frequent and severe joint pain. Timely access to multidisciplinary pain treatment facilities (MPTF) is important in managing chronic pain for these persons. However, they often have to face extensive waiting lists before receiving services. Our aim was to evaluate the associa-tion between waiting time for MPTF and change in quality of life for

persons with rheumatic conditions during the 6-months following treatment initiation.

Methods: We conducted a retrospective study using the Quebec Pain Registry, a database of patients who received services within five MPTF in Québec between 2008 and 2014. Patients were categorized according to their waiting time before the initial appointment: < 2 months, 2-6 months and > 6 months. The outcome was change in quality of life from baseline to 6 months, as measured by the 12-item Short-Form Health Survey version 2 (SF-12v2), which includes a mental component scale (MCS) and a physical component scale (PCS). Statistical analyses included generalized estimating equations (GEE) and Chi-square tests.

Results: Of the 3230 patients included in the analysis, 29% waited < 2 months, 32% waited 2-6 months and 39% waited > 6 months (missing n = 437). Significant improvements from baseline to 6 months were observed for the SF-12v2 PCS (2.3 ± 7.8) and MCS (2.2 ± 9.5). GEE analyses showed a significant time X group effect ($p < 0.001$), with patients in the < 2 months group who experienced a greater improvement in both scales compared to the 2-6 months and > 6 months groups. There was no significant difference between patients who waited 2-6 months and those who waited > 6 months. A significantly higher proportion of patients in the < 2 months group (45.9%) reached the minimal clinically important difference for the PCS (3.3 pts), compared to the 2-6 months group (37.6%) and in the > 6 months group (39.4%) ($p = 0.010$).

Conclusion: Waiting time before receiving services in MPTF was associated with improvement in quality of life for patients with rheumatic conditions. A greater improvement was observed in patients who waited < 2 months compared to those who waited > 2 months. Also, longer waiting times were associated with fewer patients reaching meaningful improvements. These results suggest the need to identify and implement strategies to reduce waiting times for MPTF and mitigate their impacts for patients with rheumatic conditions. Supported by a CIORA Grant.

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Exploring Cannabis Use and Perspective Among Patients in a Psoriatic Disease Cohort in Canada

Jackie Tsang (University of Toronto, Toronto); Rohan Machhar (Toronto Western Hospital, Toronto); Remy Pollock (University of Toronto Psoriatic Arthritis Program, Centre for Prognosis Studies in the Rheumatic Diseases, Krembil Research Institute, University Health Network , Toronto); Dafna Gladman (Department of Medicine of University of Toronto, Krembil Research Institute, Toronto Western Hospital, Toronto)

Objectives: Psoriatic arthritis (PsA) is an inflammatory arthritis affecting up to 30% of patients with psoriasis (Ps), which can lead to joint and spinal pain and stiffness. Cannabis poses as an attractive means to manage pain due to its recent legalization for recreational use and sedative properties. The prevalence and patterns of medicinal and recreational cannabis use among patients with Ps and PsA in Canada has not yet been studied, and the correlation of cannabis use on psoriatic disease activity is unknown. Our specific aims were to explore the patterns and perceived benefits of cannabis among PsA and Ps patients, to assess whether cannabis use in Ps and PsA patients was correlated to disease severity, to determine if cannabis use had a significant impact on health-related quality of life, pain, or psychosocial outcomes in these patients.

Methods: Ps and PsA patients enrolled in the International Psoriasis and Arthritis Research Team (IPART) program were surveyed on perceived benefits, perspectives, and frequency of cannabis use. Demographic and clinical variables were compared between users and non-users using Student's t-test or Mann-Whitney U test for continuous variables, and chi-square or Fisher's exact test for categorical variables.

Results: Of 151 respondents, 44% reported current cannabis use within the last year. Compared to non-users, cannabis users were younger ($p = 0.02$) and more likely to have longer PsA duration ($p = 0.03$). Additionally, users were more likely to have a higher number of damaged joints than non-users ($p = 0.0001$). Moreover, cannabis users were more hesitant to ask their healthcare team for information about cannabis prior to its legalization ($p = 0.02$) and were more likely to want information on cannabis from their healthcare team when compared to non-users ($p = 0.0001$). Respondents primarily report their perceived benefits of cannabis use to be aid in sleep (63%) and arthritis pain relief (54%). Lastly, there were no differences between cannabis users and non-users in health-related quality of life, pain, or psychosocial outcomes.

Conclusion: This study is amongst the first to investigate the prevalence and patterns of cannabis use among a psoriatic disease population. The results indicate that 44% of this sample of 151 patients used cannabis within the past year and 54% of users report to use cannabis for arthritis pain relief. Knowledge of the patient demographics of cannabis users can help guide clinicians in counselling patients and aid in the development educational materials to promote responsible use. Top 10 Poster

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Biologic DMARD Use in Rheumatoid and Psoriatic Arthritis Patients by Rheumatologists at the University of Alberta

Shabnam Hamidi (University of Alberta , Edmonton); Bryce Tkachuk (University of Alberta, Edmonton); Jill Hall (University of Alberta, Edmonton); Joanne Homik (University of Alberta, Edmonton); Anthony Russell (University of Alberta, Edmonton); Stephanie Keeling (University of Alberta, Division of Rheumatology, Edmonton)

Objectives: Rheumatologists are increasingly using a "treat-to-target" approach for inflammatory arthritis (IA) patients which may increase the use of disease modifying anti-rheumatic drugs (DMARDs) and biologics (bDMARDs). Given the known benefits but substantial costs of bDMARDs, we evaluated the use of DMARDs and bDMARDs by rheumatologists at the University of Alberta.

Methods: A retrospective chart review of four rheumatologists' patients seen at the University of Alberta from January 2013 to July 2019 with rheumatoid (RA) or psoriatic arthritis (PsA). A cohort composed of ~100 patients per rheumatologist were identified using ICD9 coding in the electronic medical record. Data collected were pre-specified and entered in REDCap (SH/BT) and included patient demographics, disease profile, rheumatologic medications, and treating rheumatologist. Data were analyzed using descriptive statistics (number (percent) or mean (standard deviation)).

Results: A total of 401 IA patients (305 RA; 96 PsA) were included (306 (76.3%) female, mean age at onset was 44 years). bDMARDs were ever initiated in 142 patients (35.2%). The most common class of biologic was TNF-alpha inhibitor (n = 122, 86%), followed by IL-6 inhibitors (n = 5, 4%), and IL-17 inhibitors (n = 4, 3%). The relative frequency of biologics initiated were etanercept (n = 38, 26.7%), adalimumab (n = 36, 25.5%) and golimumab (n = 27, 19%). The mean time from diagnosis to biologic initiation was 4.6 (5.9) years. In the bDMARD group, the baseline mean number of swollen and tender joints were 6.3 (7.6) and 7.2 (9.1) respectively, with 50% (n = 64) anti-CCP positive and 67% (n = 127) rheumatoid factor positive. Eighty-two patients (58%) in the bDMARD group were taking concomitant methotrexate. The mean number of bDMARD classes utilized per patient was 1.5 (0.92) while the mean number of bDMARDs was 1.8 (1.2). Prescription rates of bDMARDs varied broadly between the four rheumatologists (13-60%).

Conclusion: Over a third of patients in northern Alberta have been prescribed biologic agents, which is higher than hypothesized. A possible explanation includes the increased treat-to-target strategies implemented amongst rheumatologists over time. The differential rates of bDMARD prescription between rheumatologists may reflect the years in practice, accumulation of established IA patients over time and increased comfort with biologic use. Further study is needed to determine bDMARD prescription rates across a wider cohort in Alberta and across Canada.

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Ehlers-Danlos and Rheumatoid Arthritis: A Rare Disease Presentation

Azin Rouhi (University of Alberta, Edmonton); Elaine Yacyshyn (Division of Rheumatology, University of Alberta, Edmonton)

Background: Ehlers-Danlos syndrome is a genetic connective tissue disorder thought to be caused by mutations in genes coding for collagen proteins. There are several subtypes of Ehlers-Danlos with clinical presentations that vary from mild to severe. We report a rare case of an Ehlers-Danlos patient who presented with erosive seronegative Rheumatoid Arthritis (RA).

Case Presentation: A 55 year old female with known Ehlers-Danlos was initially evaluated in 2005 with symptoms of inflammatory arthritis affecting several joints including small joints in the hands, knees and ankles. Serology was negative for anti-CCP, ANA, and anti-ds DNA. Rheumatoid factor was mildly positive, but negative on repeat testing. She was diagnosed with RA and treated with several DMARDs including hydroxychloroquine, azathioprine, and sulfasalazine. She developed side effects on these DMARDs and discontinued them. Subsequently, she was hesitant to try another DMARD and instead received monthly steroid injections and NSAIDs for pain relief. She was re-evaluated and found to have evidence of active synovitis in her PIP and MCP joints as well as bilateral ankles and knees with several hours of morning stiffness. She was started on methotrexate, which was not tolerated. She then started treatment with intramuscular gold as a DMARD. The patient continued to have active synovitis and evidence of erosions on follow up X-rays. In 2011, adalimumab was added to her treatment. Her joint symptoms improved significantly while on adalimumab and gold injections. In 2013, gold injections were stopped due to side effects. By 2017 the patient had decreased response to adalimumab and was noted to have progression of her arthritis as evidenced by decreased range of motion of her right wrist with subluxation deformity and boutonniere deformity of several digits bilaterally. Additional DMARD medications were not started due to patient preference. Her RA stabilized by 2018 while on adalimumab monotherapy with no additional deformities. At her last evaluation, she had a DAS28 of 2.7, and a HAQ of 0.25, with no swollen, and 4 tender joints. Patient global was 3/10 and morning stiffness was 0. She currently remains on adalimumab for treatment of her erosive RA on background of Ehlers-Danlos.

Conclusion: Patients with Ehlers-Danlos often present with musculoskeletal injuries secondary to joint hypermobility and excessive laxity. We present a case of a patient with Ehlers-Danlos syndrome and erosive seronegative RA, who is currently stable on biologic therapy. There are limited reports of patients with Ehlers-Danlos developing an inflammatory arthritis.

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Advocating for and Supporting People Living in Pain Through the Opioid Crisis

Linda Wilhelm (Canadian Arthritis Patient Alliance, Midland); Dawn Richards (Canadian Arthritis Patient Alliance, Toronto); Nathalie Robertson (Canadian Arthritis Patient Alliance, Ottawa); Janet Gunderson (Canadian Arthritis Patient Alliance, Glaslyn); Annette McKinnon (Canadian Arthritis Patient Alliance, Toronto); Alexandra Sirois (McGill University, Montreal); Laurie Proulx (Canadian Arthritis Patient Alliance, Ottawa)

Objectives: Chronic pain is a key characteristic of various types of arthritis. People with arthritis often rely on many types of treatments, including opioids to manage their quality of life and to allow them to contribute to society. Canada's opioid crisis is characterized by a rapid rise in rates of drug overdose and death, yet there has been little thought or discussion of the unintended consequences of subsequent reactive policy on opioids for people living with chronic pain. As such, the Canadian Arthritis Patient Alliance developed a survey to hear from people living with chronic pain, and to develop resources for them as well as guidance for policymakers and people in government to understand these consequences and how to avoid them moving forward.

Methods: In 2018, a fifteen-question survey was developed to understand the consequences of the opioid crisis on chronic pain patients. A CAPA Board member led the development and analysis of an on-line survey. The survey was promoted through CAPA partners and networks for ten weeks. The survey results informed the development of resources for patients and policy makers to understand and address the barriers and stigma of taking opioid medications.

Results: There were 264 survey responses and 75% of respondents have taken or currently take opioids for chronic pain. More than half of chronic pain patients noted that their doctor spoke to them about tapering or stopping opioid medication and how the recent media focus on opioids impacted how they feel about their medication. Survey results were presented to the Federal Minister of Health during Health Canada's Opioid Symposium, via a roundtable in September 2018. Subsequently, a National Pain Taskforce was created in April 2019 with two of eight members from the arthritis community. Resources was developed for patients to provide support on navigating barriers in pain treatment. A second resource was developed for policy makers to provide recommendations on how to better support people living with chronic pain.

Conclusion: CAPA has been involved in shining light on unintended policy consequences of the opioid crisis on people who live with chronic pain. Through engaging the chronic pain community, CAPA will continue to share the resources to facilitate a dialogue between people living with chronic pain and policy makers.

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Are Patterns of Early Disease Severity Predictive of Grade 12 Academic Achievement in Patients with Childhood-onset Chronic Rheumatic Diseases?

Lily Lim (University of Manitoba, Winnipeg); Okechukwu Ekuma (University of Manitoba, Winnipeg); Ruth Marrie (University of Manitoba, Winnipeg); Marni Brownell (University of Manitoba, Winnipeg); Christine Peschken (University of Manitoba, Winnipeg); Carol Hitchon (University of Manitoba, Winnipeg); Kerstin Gerhold (Department of Pediatrics and Child Health, University of Manitoba, Winnipeg); Lisa Lix (University of Manitoba, Winnipeg)

Objectives: Youths with childhood-onset chronic rheumatic diseases (ChildCRD) –juvenile arthritis (JA) and systemic autoimmune rheumatic diseases (SARD)– have worse grade 12 standards tests results compared to their peers. We aimed to test if disease severity predicted the performance of ChildCRD patients on grade 12 standards tests.

Methods: Population-based longitudinal cohort study from one Canadian province. SARD includes systemic lupus erythematous, dermatomyositis, Sjogren's syndrome and systemic sclerosis. All ChildCRD patients had been recorded in a registry since 1984. Data from ChildCRD patients born 1979-1998 (grade 12, 1996-2015) were linked to the administrative health (hospitalizations, physician billings, medications), education (grade 12 standards tests and enrollment) and social data (income assistance, child welfare involvement) housed in the provincial population data repository. Outcomes: Validated language and arts achievement index (LAI) and Math achievement index (MAI) derived from grade 12 standards tests results and enrollment data. Key predictor and covariates: We constructed a universal disease severity indicator using latent class trajectory analysis (including disease groups: SARD, oligo- and non-oligoarticular JA, as membership covariate) of all physician visit within the first 3.5 years after diagnosis (early disease). Model covariates included an area-based socioeconomic factor index (SEFI2), maternal age at first childbirth, family ever on income assistance or involved with child welfare services, psychiatric morbidities pre-diagnosis and in the 12-months preceding tests. Model: Effects of the severity indicator and covariates were tested in linear regressions for LAI and MAI; standardized coefficients (b) with standard errors (SE) and scaled deviance(DEV) were reported.

Results: 541 participants (474 JA, 44 SARD), 70% females, were studied. The best latent class model of disease severity had 3 latent trajectories: high (9%), moderate (54%) and low numbers of visit (37%) corresponding to severe, moderate and mild disease severities. The membership probabilities for the 3 groups were > 0.95. The severe group predicted worse results in LAI (b = –0.44, SE = 0.17, p < 0.01) and MAI (b = –0.54 SE = 0.17, p < 0.01) in univariable models. After covariate adjustments, the severe disease group did not predict LAI, (b = –0.29, SE = 0.16, p = 0.06, DEV = 1.03 but predicted MAI, b = –0.41, SE = 0.15, p < 0.01,DEV = 1.03).

Conclusion: Early longitudinal patterns of disease severity in early disease predicted grade 12 Math standards tests results of ChildCRD patients, after covariate adjustment. Recognizing severe disease in early disease, in association with sociodemographic and psychiatric histories can help identify ChildCRD patients who are at risk of reduced academic achievement and who may benefit from increased education support. Best Abstract on Research by Young Faculty Award.

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Delineating Early Response Trajectories to Biologics in Polyarticular Juvenile Idiopathic Arthritis

Lily Lim (University of Manitoba, Winnipeg); Armend Lokku (University of Toronto, Toronto); Sarah Ringold (Seattle Children's Hospital, Seattle); Eleanor Pullenayegum (University of Toronto, Toronto)

Objectives: Most biologic trials in juvenile idiopathic arthritis (JIA) treat all participants with the biologic under study for 12 to 16 weeks before randomizing responders into a withdrawal phase. If treatment response can be predicted from early response patterns (<12-16 weeks), this information may be used to allow earlier termination of ineffective treatment. We aimed to delineate the early treatment response trajectory of JIA patients to biologics.

Methods: Longitudinal data from early treatment phase (12-16 weeks) from 3 JIA trials: 1) Tocilizumab (Roche), 2) Etanercept (Amgen) and 3) the Trial of Early Aggressive Therapy TREAT (Etanercept), were obtained and combined. Primary outcome is the ACR (pediatric) response states: ACR50, 70, 90. Clinically significant minimal improvement was defined as attaining at least an ACR50 state. Secondary outcome was the clinical juvenile arthritis disease activity score (cJADAS): inactive, low, moderate and high disease states. Longitudinal responses (ACR and cJADAS states) were modelled using the Markov multistate model.

Results: 342 patients (188 Tocilizumab, 69 Etanercept, 85 TREAT) with polyarticular course JIA were studied. 27% were males, median age at baseline (25th -75th percentile P) was 10.0 (5.7- 15.0) years and median (25th– 75thP) duration of disease was 3.6 (1.0- 8.7) years. Baseline median (25th-75thP) active joint counts was 15 (7-24). Patients were on methotrexate (46%) and corticosteroids (34%) at baseline. 87% patients were on biologics (Tocilizumab 188, Etanercept 111). At week 4, the probabilities of transitioning from active disease to ACR50, 70 and 90, was 0.29, 0.13, 0.03. Probabilities of transition continued to increase from week 4 to 16. At week 16, the probabilities of transition to ACR50, 70, 90 were: 0.19, 0.32, 0.25. Even if no clinically significant minimal improvement was achieved by week 4, the probabilities of attaining this was substantial by weeks 12 (0.55) and 16 (0.67). At week 4, the probabilities of transition from a high cJADAS state to a moderate state was 0.20, to low state was 0.01, and to inactive disease < 0.01. At week 16, the probabilities of attaining a moderate, low or inactive cJADAS state was 0.36, 0.10 and 0.11.

Conclusion: Patients treated with biologics continued to improve over the first 12-16 weeks, without plateau. Lack of early clinically significant minimal response did not preclude such response by 16 weeks. Therefore, JIA patients should not be switched out of biologics before 16 weeks for a lack of effectiveness.

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Longitudinal Work Transitions in Early Inflammatory Arthritis Patients: Are There Targets for Intervention to Improve Employment?

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Objectives: Historically, rheumatoid arthritis patients stop working overtime, often due to their disease. The trajectory of work transitions in early arthritis is unknown. We aimed to delineate the longitudinal work transition trajectory of early arthritis patients and to identify predictors of work change.

Methods: Single center retrospective inception longitudinal cohort study of early inflammatory arthritis (EIA) patients (onset 1 year at diagnosis), treated to target. Disease activity score 28 (DAS28– 3 variables), and patient reported outcomes were collected at each visit. Work status was recorded annually. The primary outcome was employment states: full-time (FT), part-time (PT), unemployed, homemaker/ student, work disability (WD), retired (RE). We used the Markov multistate model to calculate probabilities of employment state changes (FT, PT, WD, RE, no income (NI) comprising of students & homemakers). Candidate predictors, both time-invariant and time-varying, including: socio-demographics, EIA activity, patterns of joint involvement (large upper or lower extremity joints, small upper or lower extremity joints), functional capacity (health assessment questionnaire, HAQ), quality of life (Short Form 36, SF36) and self-reported comorbidities (other chronic diseases, mental illnesses) were tested for association with employment transitions.

Results: 312 patients (77% females) diagnosed from 2000-2017, not retired at baseline, had a median age at diagnosis was 45.3 years (33.3–52.7, 25th-75th percentiles percentile P), median duration of follow-up was 4.3 years (1.1– 9.8, 25th-75th P), median baseline DAS28 was 4 (2.9– 5.1, 25th-75thP) and 48% were rheumatoid factor positive. At baseline, 51% were working FT, 14% PT, 7% were students, 13% were homemakers, 8% WD. Baseline median completed school years was 12 yrs. (12-15, 25th-75thP). Patients most likely stayed in the state of employment they were in at baseline, at 1, 5, 10 yrs. Probabilities of transitioning to a FT/PT state from baseline NI increased to 0.33 (5 yrs.) and 0.45 (10 yrs.), from baseline WD from 0.22 (5yrs) to 0.31 (10 yrs.). Older age was protective of transitioning from PT to NI (hazard ratio, HR 0.87; 95% CI 0.82-0.93). Fatigue was associated with increased transitions from PT to NI (HR 1.02, 95%CI 1.00-1.04). Better SF36 was protective of transition from FT to WD (0.92, 95% CI 0.86-0.98). Sex, education, arthritis characteristics, comorbidities & mental health were not associated with employment transitions.

Conclusion: Employment states in EIA patients changed dynamically over time. Even individuals who had NI or were WD at diagnosis had increasing probabilities of moving into a working state over time.

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Neutrophils are an Important Source of Microparticles in Lupus and Asymptomatic ANA+ Individuals

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Objectives: Microparticles (MPs) in the circulation of systemic lupus erythematosus (SLE) patients are enriched for nucleic acids and complexed with IgG (MP-IC), as compared with those from healthy controls (HC). These MPs have been shown to activate monocytes, suggesting that they are an important stimulus for the production of pro-inflammatory factors in SLE. In this study, we examined MPs in ANA+ subjects representing

the continuum from asymptomatic individuals through to SLE patients to determine whether the origin of MP-ICs and MPs enriched with nucleic acids differ between symptomatic and asymptomatic individuals.

Methods: Flow cytometry was used to examine the number, origin, nucleic acid content, and IgG binding of peripheral blood Annexin V+MPs in ANA-HC (n = 16), ANA+NS (≥ 1:160 by IF, n = 48), ANA+ individuals with insufficient criteria for definitive SARD diagnosis (undifferentiated connective tissue disease, UCTD, n = 26) and SLE patients (n = 33). MP nucleic acid content was determined by staining with Syto13 and the MP cell source by staining with antibodies against CD41a (Platelets), CD105 (endothelium), CD14 (monocytes), CD66b (neutrophils), CD19 (B cells), CD3 (T cells), and CD235a (erythrocytes).

Results: Consistent with published work and with our previous data, SLE patients had increased levels of MPs and MP-ICs that contained higher levels of nucleic acids, as compared to ANA- HC. A subset of ANA+NS had similar elevations in the amount of nucleic acid content to those seen in SLE. The majority of MPs obtained from HC exhibited platelet markers. Notably, in asymptomatic and symptomatic ANA+ individuals the proportion of Annexin V+ platelet-MPs was reduced compared to HC. Not differences in the total number of platelet-MPs were observed between groups. Together these observations suggest the presence of other sources of MPs in ANA+ individuals. There were increased proportions of neutrophils-MPs in ANA+ NS individuals and SLE patients compared to HC and UCTD, which may suggest neutrophils as a source of MPs in ANA+ subjects. This finding was not prominent in the UCTD group implying other sources of MPs in this group that remain to be determined. There was a non-statistically significant trend to higher endothelial MPs in ANA+ individuals. No CD19, CD3, or CD235a positive MPs were detected.

Conclusion: Neutrophils are a significant source of auto-antigenic MPs in both ANA+NS individuals and SLE patients. However, it appears to be more prominent in SLE patients, raising the possibility that it contributes to the pro-inflammatory process that discriminates asymptomatic and symptomatic ANA+ individuals.

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Investigating the Differences in ANA Specificities Between Asymptomatic and Symptomatic ANA+ Individuals.

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Objectives: In the Anti-Nuclear Antibody (ANA) associated Systemic Autoimmune Rheumatic Diseases (SARD), such as Systemic Lupus Erythematous (SLE), Sjögren's Disease (SjD), and Systemic Sclerosis (SSc), auto-antibodies (auto-Ab) develop long before the onset of symptoms. The number/levels of these Ab may increase as patients progress towards symptomatic disease. Only a small number of ANAs are assessed using standard screening techniques (~11 for Bioplex-2200 ANA Screen) and thus additional changes in the auto-Ab profile that have not been appreciated may accompany and predict disease progression. Here we examined the auto-Ab profile for a broad range of auto-antigens across 245 subjects to address this question.

Methods: A microarray was used to simultaneously measure 161 IgM and IgG auto-Ab specificities in ANA- healthy controls (HC, n = 38), ANA+ (≥1:160 by IF) individuals lacking SARD criteria (ANA+ NS, n = 83), ≥ 1 SARD criteria but insufficient for a diagnosis (undifferentiated connective tissue disease (UCTD), n = 52), or early SARD patients (26 SLE, 30 SjD, and 16 SSc). ANA+ NS and UCTD patients were followed yearly for up to 4 years, with progression defined as the development of new diagnostic criteria. Microarray data were log2 transformed and linear modeling performed using patient sex and age as covariates, with false-discovery rate (FDR) adjustment of the p-values. A dual threshold of FDR < 0.05 and |coefficient| >1 was used to identify statistically significantly differentially abundant auto-Ab for each patient group, as compared with HC.

Results: In general, there was a strong correlation between the levels of the auto-Ab detected by Bioplex and the corresponding auto-Ab in the microarray. Following unsupervised clustering, IgG but not IgM auto-Ab showed clear patterns by diagnosis. A subset of ANA+ NS and UCTD individuals were admixed with SLE and SjD patients, which included the majority of progressors. Many more IgG auto-Ab were elevated in SLE than in the other ANA+ groups (119 SLE, 36 SjD, 18 SSc, 22 UCTD, 38 ANA+ NS) indicating that self-tolerance is significantly more disrupted in SLE than in other SARDs. The presence of IgG anti-Ro52 and -myosin binding protein C Ab were associated with progression in both ANA+ NS and UCTD individuals. IFN-induced gene expression correlated with IgG anti-Ro and -La Ab, with the strongest correlation (q = 10-16) seen for Ro60.

Conclusion: ANA+ individuals have auto-Ab to many self-antigens that are not being captured by current screening techniques. Measurement of these additional auto-Ab specificities may be useful for identifying individuals at high risk of progression. Best Abstract by a Post-Graduate Research Trainee Award

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Sarcoidosis and Severe Hypercalcemia

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Background: Sarcoidosis is an inflammatory disorder characterized by noncaseating granulomas and predominantly affects the respiratory system. Extrapulmonary sarcoidosis is rare. Hypercalcemia is a known complication in patients with sarcoidosis, but it is rarely the presenting feature and rarely severe. We present a case of severe hypercalcemia as the initial finding in a new diagnosis of acute sarcoidosis.

Case Presentation: A 34-year-old male with a past medical history of poorly controlled type 2 diabetes and hypothyroidism presented with a 1-month history of nausea, abdominal pain, weight loss, and constitutional symptoms. On assessment in the emergency department, he was found to have a significant AKI and severe hypercalcemia with an ionized calcium of 3.4 mmol/L (Normal 1.13-1.32). PTH was suppressed, 25-hydroxy vitamin D was low, and 1,25-dihydroxyvitamin D was normal. A chest x-ray was performed demonstrating a mediastinal mass. This was followed by a CT scan showing diffuse mediastinal, axillary and cervical lymphadenopathy as well as splenomegaly. Given his overall presentation, a diagnosis of hematologic malignancy was favoured. He was given IV hydration and multiple doses of bisphosphonates which improved his AKI and hypercalcemia. An excisional cervical lymph node biopsy was performed with pathology demonstrating noncaseating granulomas. He then went on to

develop bilateral ankle arthralgia and lower extremity myalgia. A diagnosis of acute sarcoidosis was made and he was treated with oral prednisone with resolution of his hypercalcemia and other symptoms.

Conclusion: Hypercalcemia is associated with sarcoidosis in approximately 5-10% of cases. However, clinically significant hypercalcemia or hypercalcemia as a presenting feature is much less common and is suspected to occur in less than 5% of cases. The abnormalities in calcium metabolism are typically due to the production of 1,25-dihydroxyvitamin D by activated lymphocytes and macrophages present in noncaseating granulomas. Some literature has suggested that the hypercalcemia of sarcoidosis can also be associated with PTH-related peptide. Management of hypercalcemia associated with sarcoidosis is generally aimed at treatment of the underlying condition, often with glucocorticoids. Other interventions include reduction of dietary calcium and bisphosphonates. Hypercalcemia is a rare presenting feature of sarcoidosis and can imitate hematologic malignancy, particularly in the context of diffuse lymphadenopathy and suppressed PTH level. Although increased 1,25-dihydroxyvitamin D production is usually the etiology of hypercalcemia in sarcoidosis, the presence of PTH-related peptide may also be a contributing factor. Treatment is aimed at managing the underlying sarcoidosis.

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Interferon-Induced Cytokines as Surrogate Markers of the Interferon Signature in Asymptomatic and Symptomatic ANA+ Individuals

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Objectives: The Anti-Nuclear Antibody (ANA) associated Systemic Autoimmune Rheumatic Diseases (SARDs) are characterized by multisystem compromise and high morbidity. We have previously shown that a subset of asymptomatic ANA+ individuals (NS ANA+) have elevated interferon (IFN) signature and that they may be at increased risk for progression. However, the IFN signature is cumbersome to measure, limiting its clinical utility. Recently, it has been shown that levels of certain IFN-induced cytokines, CXCL-10 and Galectin-9, correlate with the magnitude of IFN signature in SARD patients. Here, we sought to determine whether a similar correlation is observed in NS ANA+ and whether elevated levels of these cytokines can be used to discriminate NS ANA+ progressors from non-progressors.

Methods: Healthy ANA- controls (HC), NS ANA+, subjects with at least one symptom (Undifferentiated Connective Tissue Disease, UCTD), or meeting SARD classification criteria (SARD) were recruited. NS ANA+ and UCTD patients were followed yearly for up to 4 years, with progression defined as the development of at least one new SARD diagnostic criterion. IFN-induced gene expression was quantified by NanoString and the levels of five IFN-induced genes were summed to produce an IFN5 score. IFN-a, Galectin-9, and CXCL-10 were measured by ELISA.

Results: A total of 254 subjects were included in the study, with the majority being female and Caucasian. A subset of male HC had high levels of Galectin-9 and CXCL-10, whereas no such elevations were seen in female HC. Consequently, subsequent analyses were performed only on females. Significantly higher levels of Galectin-9 were observed in SARD patients compared to female HC, NS ANA+, or UCTD patients. However, the levels of Galectin-9 and CXCL-10 showed only weak correlations with the IFN5 score ($r = 0.35$, $p < 0.0001$ and $r = 0.23$, $p < 0.0003$, respectively). Serum IFN-a levels correlated best with the IFN5 score both in ANA+ individuals lacking a SARD diagnosis and early SARD patients ($r = 0.48$, $p < 0.0001$ and $r = 0.68$, $p < 0.0001$, respectively). Unlike other SARD conditions, Systemic Sclerosis patients showed a better correlation between Galectin-9 and IFN5 score than the other cytokines ($r = 0.70$, $p = 0.014$). Among the subjects who had at least one specific antibody and one year of follow up, clinical progressors had significantly higher levels of Galectin-9 and CXCL-10 compared to non-progressors.

Conclusion: Measurement of serum IFN-a is a useful surrogate marker for the IFN signature in female preclinical SARD patients and SARD patients. Elevated levels of Galectin-9 and CXCL-10 may be helpful in predicting disease progression in ANA+ individuals lacking a SARD diagnosis. Best Abstract on Basic Science Research by a Trainee Award

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Inter-Rater Reliability of the Bhavsar-Khalidi Clinical Scoring System for Risk Stratification of Giant Cell Arteritis

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Objectives: Giant cell arteritis (GCA) is a common systemic vasculitis with serious potential complications, yet definitive, rapidly accessible diagnostic tools are lacking. Temporal artery biopsy (TAB) has imperfect sensitivity, and advanced imaging modalities, such as temporal artery ultrasonography and magnetic resonance angiography (MRA), are currently not ubiquitously available in Canada. A point-of-care clinical risk stratification tool, the Bhavsar-Khalidi (BK) Score, has shown promising sensitivity (87%) and specificity (65%) when compared to a gold standard of clinical diagnosis at long-term follow-up, yet its reliability remains unknown. Herein, we report the inter-rater reliability of the BK Score.

Methods: Two non-rheumatologist raters independently extracted clinical variables from medical records of 20 patients, randomly sampled from the first 100 patients of a prospective cohort referred to a tertiary rheumatology clinic for possible GCA. Variables (with associated weightings) included: typical headache (3), atypical headache (1), scalp tenderness (2), jaw claudication (3), sudden visual loss (4), other visual symptoms (1), polymyalgia symptoms (1), constitutional symptoms (1), temporal artery tenderness (2), temporal artery decreased pulsation (2), and ESR > 40 or CRP > 10 (1). Total scores stratified risk into very low (< 3), low (3-4), moderate (5-7), or high (> 7) risk for GCA. Inter-rater agreement was determined with intraclass correlation coefficient (ICC) using a two-way random-effects model (2,1) for total score agreement, and linear-weighted kappa for categorical risk agreement, with associated 95% confidence intervals (CI).

Results: This sample was 60% female, with a mean (standard deviation) age of 72.7 (9.1) years, BK Score of 6.3 (3.6), 80% received corticosteroids, and 35% were ultimately diagnosed as GCA after minimum 3 months follow-up. TAB was performed in 9/20 patients, completed an average 31.3 (9.6) days after corticosteroid initiation, and was positive in 5/9 patients. MRA was performed in 19/20 patients, completed an average 17.5 (4.8) days after corticosteroid initiation, and was suggestive of GCA in 8/19 patients. Raters concordantly stratified risk for 13/20 patients, as very low (2/13), low (3/13), moderate (4/13), and high (4/13). ICC for total BK Score inter-rater agreement was 0.917 (95% CI 0.787-0.968). Linear-weighted

kappa for categorical risk inter-rater agreement was 0.643 (95% CI 0.402-0.884). Cohen's kappa for binary inter-rater risk agreement of very low and low risk versus moderate and high risk was 0.588 (95% CI 0.235-0.940).

Conclusion: The BK Score demonstrates good inter-rater reliability for both total score and risk stratification. This supports its utility for early risk stratification when considering corticosteroid therapy, and further testing for patients with possible GCA.

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Results of Pain Management Survey for Rheumatology Residents and Practicing Rheumatologists in Canada

Lauren Glick (University of Toronto, Toronto); Jacqueline Hochman (Women's College Hospital, Toronto)

Objectives: Inadequate pain education is a barrier to best-practice pain management. We surveyed Canadian rheumatologists and trainees to assess attitudes and perceived competencies in pain management to inform future learning activities.

Methods: A 22-item needs assessment questionnaire was developed and disseminated by email to all Canadian Rheumatology Association (CRA) physician and resident members. The data was analyzed using descriptive statistics and bivariate analysis.

Results: 92/460 CRA members completed the survey. The majority of respondents were female (62%), practicing rheumatologists (85%), from academic health centres (59%) in urban settings (91%) with a wide distribution of years in practice. 40% of respondents decline referrals for each of chronic neck pain, back pain, and FM. 25% decline regional MSK disorders (e.g. OA, tendinitis). However, 50% reported that a subset of follow-up patients (25-49%) have chronic non-inflammatory pain as their main issue. The majority (64%) reported it is the role of the rheumatologist to diagnose chronic non-inflammatory MSK pain conditions and guide the referring MD on appropriate treatment, though 11% felt there is no role for the rheumatologist. 65% felt patients with moderate to severe chronic pain benefited from their diagnosis and education, though only 30% felt they could help them. Regarding competency in managing non-inflammatory pain, 61% reported low competence ('not at all' or 'slightly' competent) following residency training and 32% reported current competence is low. A high proportion of respondents report low competence in managing pain in patients who are elderly (45%), have history of substance abuse (73%) or have active psychiatric disorder (78%). Low competence was also reported for prescribing opioids (66%) and cannabinoids (81%). 26% reported changes to opioid prescribing in response to opioid crisis, but the majority reported they were not opioid prescribers to begin with. Higher overall competence was reported by male respondents and those with more years in practice, working solely in outpatient settings. Lack of education in pain management was considered a 'frequent' barrier to optimal pain management by 40%. 36% percent of respondents had never attended a pain education program.

Conclusion: The majority of survey respondents feel there is a role for rheumatologists to play in managing chronic non-inflammatory pain. However, self-perceived competence in chronic pain management was low in 2/3 following residency training and remains low in 1/3 of survey respondents. Lack of education in pain management was a recognized barrier to optimal pain management. Priority topics for future learning opportunities were identified.

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Chronic and Complex Pain in Children and Adolescents in Manitoba – A Retrospective Chart Review

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Objectives: Despite having around 10,000 children affected by chronic pain, Manitoba remains the only province in Canada with a university-affiliated hospital without a funded multidisciplinary pain treatment facility (MPTF) for pediatric chronic pain. Since October 2015, a pediatric rheumatologist has provided care in a limited, non-funded chronic pain clinic with restricted consultative service from physiotherapy and occupational therapy. The objective of this study was to characterize the patient population within this clinic and analyze referrals and wait times in order to quantify the need for a MPTF.

Methods: Patients included in this retrospective review were less than 18 years of age referred to the chronic pain clinic for youth at the Children's Hospital in Winnipeg between October 1, 2015 and December 31, 2018. Data was collected from electronic medical charts between May-August 2019 and entered into REDcap. Ten percent of the charts were reviewed by a second person. Data was analyzed using SPSS Inc., version 25. Chi-squared and Kruskal-Wallis analysis were used for referral volumes and wait times, respectively.

Results: A total of 158 patients between 4 and 17 years of age (median 14 years, 75.3% female) entered the clinic. Patients experienced pain on average for 30.5 months (SD 29.9) prior to their first visit. Of this cohort, 74.0% of patients had difficulties with sleep, 76.6% had daytime fatigue, 86.5% experienced symptoms of anxiety, 58.6% had symptoms of depression, and 80.3% had withdrawal from physical activity. The clinic experienced a significant increase in number of referrals between 2015 and 2018 (p = 0.003). There was a remarkable increase in the median wait time between the date of the referral and the first visit from 27 days for patients with a first visit in 2015, 52 days in 2016, 60 days in 2017, 65 days in 2018 and 106 days in 2019 (p = 0.012).

Conclusion: The current prolonged wait time until the first visit in the preliminary clinic for youth with chronic pain is by far higher than the International Association for the Study of Pain's recommended wait time of 8 weeks. The increasing number of referrals, prolonged wait time as well as the physical and mental comorbidities in this patient population reflects the necessity to establish a pediatric MPTF in Manitoba.

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Chronic Non-bacterial Osteomyelitis Masquerading as Fibrous Dysplasia

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Objectives: Chronic non-bacterial osteomyelitis is a rare auto-inflammatory bone disease seen predominantly in the pediatric population. We describe a unique case of a 30-year-old female who presented with right-sided jaw pain and intermittent swelling over the course of six years. She was initially treated with antibiotics for possible osteomyelitis, then temporarily diagnosed with fibrous dysplasia following three biopsies. She was ultimately found to have chronic non-bacterial osteomyelitis.

Methods: The patient underwent extensive investigations consisting of an infectious work up, numerous imaging modalities, and three separate biopsies of her right jaw.

Results: The patient was eventually diagnosed with chronic non-bacterial osteomyelitis based upon her history of recurrent flares with initial partial response to non-steroidal anti-inflammatories, previously raised acute phase reactants, and MRI findings. Unfortunately, she became refractory to non-steroidal anti-inflammatory therapy. Consequently, she was successfully treated with pamidronate, achieving clinical remission with improvement in her imaging findings.

Conclusion: This case highlights the difficulty of diagnosis of chronic non-bacterial osteomyelitis and the need for increased awareness of the disease in the adult population. Additionally, the effective treatment with pamidronate supports the use of a bisphosphonate as an early intervention for adult onset chronic non-bacterial osteomyelitis in patients who have failed non-steroidal anti-inflammatory therapy.

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Comparison between Patients with Spondyloarthritis Managed in Community Based Care Settings to those Managed in Tertiary Research Setting in Ontario: An OBRI-SPARCC Study

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Objectives: Patients with spondyloarthritis (SpA) in community practices may have less disease severity compared to those managed in tertiary care research settings. We aimed to describe the disease status of SpA patients in the community-based Ontario Best Practices Research Initiative (OBRI) cohort and compare it with the tertiary care Spondyloarthritis Research Consortium of Canada (SPARCC) cohort from Toronto.

Methods: In this cross-sectional study baseline data from patients from 11 community centres enrolled into the OBRI-SpA cohort were compared to patients evaluated at the SPARCC Toronto Cohort. Patients were matched 1:1 by assessment date (+/- 1.5 year). We compared demographics, comorbidities, disease features, patient reported outcomes and treatment using descriptive statistics, t-test and two-proportion z-test.

Results: Between March 2015 and March 2017, 143 (33 first visit) PsA and 174 (35 first visit) AS patients were enrolled into OBRI-SpA and matched to an identical number of PsA and AS patients from SPARCC. For PsA patients, although the age at study entry were similar, SPARCC patients had significantly lower mean (SD) age at diagnosis (SPARCC- 37.6(12.9); OBRI- 43.5(13.4), p = 0.0003), were less Caucasians (86%;94%;p ≤ 0.0001) and more males (59%;43%;p = 0.005). SPARCC had lower tender [2.7(5.6);4.8(6.8); p = 0.007)] and swollen [1.4(4);3.5(4.4);p ≤ 0.0001)] joint counts but more psoriasis (96%;90%p = 0.04) and elevated ESR/CRP (70%;31%;p ≤ 0.0001). The prevalence of enthesitis, dactylitis, inflammatory back pain, nail psoriasis, IBD and uveitis were similar. Depression and cancer were less prevalent in SPARCC; CVD and diabetes were similar. Patients in SPARCC were treated less with DMARDs (40%;75%;p < 0.0001); proportions treated with NSAIDs and biologics were similar. Similar proportion of patients satisfied criteria for minimal disease activity. The HAQ score was lower in SPARCC [0.5(0.6);0.9(0.7);p < 0.001]. For AS patients, the age at study entry (SPARCC-41.7(13.5);OBRI-49.8(14.6),p < 0.0001), age at diagnosis [29.4(12.5);OBRI-39.4(15),p < 0.0001] and the proportion of Caucasians (71%;88%;p ≤ 0.0001) were lower in SPARCC, but the proportion of males was similar. SPARCC had lower prevalence of enthesitis (4.3%;18.4%p ≤ 0.0001) but higher IBP (83%;50%;p ≤ 0.0001). The prevalence of IBD, uveitis, peripheral arthritis and elevated ESR/CRP was similar. CVD and diabetes were lower in SPARCC, but depression and cancer were similar. Similar proportion of patients were treated with NSAIDs, DMARDs and biologics. Although the BASDAI and HAQ were similar, the BASFI was lower in SPARCC [3(2.7);3.6(2.8);p=0.04].

Conclusion: Compared to patients seen in research settings, SpA patients in community clinics in Ontario were older at diagnosis, had more peripheral arthritis (PsA), enthesitis (AS) and worse function. Usage of biologic agents was similar. Strategies for earlier triage and referral in the community may help improve functional outcomes.

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Profile of Psoriatic Arthritis Patients Initiating Apremilast Treatment in Canadian Routine Care (the APPRAISE Study)

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Objectives: Apremilast, an oral phosphodiesterase 4 inhibitor that modulates immune responses, is approved in Canada for the treatment of active psoriatic arthritis (PsA) and moderate to severe plaque psoriasis. Apremilast demonstrated efficacy and safety for PsA in the PALACE clinical trial program; however, real-world evidence on the effectiveness and safety of apremilast in the Canadian clinical practice setting is lacking. We analyzed the baseline characteristics of patients with active PsA treated with apremilast in a real-world setting to better understand how Canadian rheumatologists utilize this medication.

Methods: APPRAISE is an ongoing observational study of PsA patients prescribed apremilast. Eligible patients ≥18 years of age with active PsA were followed from treatment initiation to 12 months, with follow-up visits suggested every 4 months. Baseline patient demographics, clinical characteristics, disease activity measures, and patient-reported outcomes were assessed descriptively.

Results: 63 patients were enrolled in the study between July 2018 and July 2019; mean age (SD) was 51.2 (11.4) years and the majority (57.1%) were female. Median duration of PsA at baseline was 2 years. PsA subtypes included mainly polyarticular (41.7%) and oligoarticular (40.0%), and 42.9% of patients had ≥2 comorbidities (most common comorbidities reported were metabolic syndrome symptoms and hypertension). A total of 93.3% of PsA patients received prior conventional disease-modifying anti-rheumatic drugs (cDMARDs) and only 18.3% received prior biologic therapy; 42.9% of patients initiated apremilast in combination with methotrexate. Dactylitis and enthesitis were present among 20.0% and 36.2% of patients, respectively. Mean (SD) tender joint (0-68) and swollen joint (0-66) counts were 7.46 (6.1) and 5.75 (5.0), respectively. Most patients (52.5%) had moderate disease activity according to the Clinical Disease Activity Index for Psoriatic Arthritis; mean (SD) Patient's and Physician's Global Assessment scores were 49.4 (25.5) and 43.6 (19.2) mm, respectively. The mean (SD) Health Assessment Questionnaire-Disability Index score was 0.86 (0.7). According to the patients' perceptions, 73% were not in an acceptable symptom state at baseline on their prior therapy.

Conclusion: Compared with PsA patients enrolled in the PALACE studies, patients in APPRAISE had shorter disease duration, moderate disease activity, and were mostly biologic naïve and dissatisfied with prior treatment (cDMARDs in most cases).

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Prevalence and Potential Risk Factors for Polypharmacy and Potentially Inappropriate Medication Use in Adults with Systemic Lupus Erythematosus

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Objectives: Polypharmacy is a strong risk factor for adverse clinical outcomes, including delirium, falls, hospitalization, and death. It is also associated with medication nonadherence in systemic lupus erythematosus (SLE) cohorts. Previously we presented novel data on polypharmacy and potentially inappropriate medications (PIMs), such as benzodiazepines and other sedative-hypnotics (BZD/Z-drugs), in older adults with SLE. In this

study we include all adults with SLE in order to: 1. Compare prevalence of polypharmacy [a) ≥ 5 and b) ≥ 10 medications] and PIM use [a) opioids, b) BZD/Z-drugs] between age groups (<40, 40-64, and ≥ 65 years), 2. Evaluate any association between polypharmacy/PIM use and potential risk factors including age, sex, rural residence, SLE duration, disease activity (SLEDAI-2K), and comorbidity [Charlson Comorbidity Index (CCI)].

Methods: Population: Adults aged ≥18 years meeting ACR/SLICC SLE criteria and seen in our rheumatology clinic < 2 years ago. Patients lacking data in the Manitoba Drug Program Information Network (DPIN) were excluded. Procedures: All demographic and clinical variables were determined using data from electronic medical records. Multivariable logistic regression models were constructed with inclusion of explanatory variables based on a priori clinical reasoning rather than stepwise selection.

Results: 392 patients included: 91% female, 39% rural, 66% on ≥ 5 and 28% on ≥ 10 medications, 23% on BZD/Z-drugs, and 23% on opioids. Prevalence of polypharmacy and BZD/Z-drug use rose with age group, whereas opioid use peaked in 40-64 year-olds. In multivariable analyses, odds of polypharmacy increased with older age (OR 2.32, 95% CI 1.08-5.00 for ≥ 65 vs < 65 years for ≥ 5 medications), rural residence [1.99 (1.23-3.22)], CCI [1.69 (1.39-2.05)], and SLEDAI-2K [3.10 (1.71-5.61)]. PIM use strongly associated with polypharmacy [5.44 (2.98-9.93), for ≥ 5 medications]. Age < 65 years [2.49 (1.15-5.38)], CCI [1.28 (1.13-1.45)], and SLEDAI-2K [1.07 (1.01-1.14)] were associated with increased odds of opioid use. Age > 40 years [(2.49 (1.26-4.92)], CCI [1.68 (1.02-2.77)], and SLEDAI-2K [1.08 (1.02-1.15)] increased the odds of BZD/Z-drug use.

Conclusion: Polypharmacy is prevalent in SLE and more likely in older adults, rural residents, and those with increased comorbidity and lupus activity. PIM use is strongly correlated with polypharmacy and increased with higher comorbidity and lupus activity. Young adults had lower odds of using sedative-hypnotics, while older adults had lower rates of opioid prescriptions. This is the first study to evaluate the prevalence and potential risk factors for polypharmacy and BZD/Z-drug use in adults of all ages with SLE. Future studies should be aimed at determining what percentage of prescriptions were appropriate, causal relationships, and impact of polypharmacy and PIM use on SLE clinical outcomes.

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Using Classification and Regression Tree Analysis to Determine the Validity of the ANAM in the Assessment of Cognitive Impairment in Patients with SLE Compared to the American College of Rheumatology Neuropsychological Battery

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Objectives: To determine: (1) sensitivity and specificity of the Automated Neuropsychological Assessment Metrics (ANAM) for screening cognitive impairment (CI) in SLE patients using the American College of Rheumatology Neuropsychological Battery (ACR-NB) as the gold standard for CI diagnosis; and (2) the most sensitive and specific subtests and scores of the ANAM for predicting CI.

Methods: 261 adult SLE patients from the University of Toronto Lupus Clinic completed the ANAM and ACR-NB on the same day. Patients were classified on the ACR-NB as impaired, unimpaired or indeterminate using the following criteria: (a) CI: A z-score of ≤ -1.5 in ≥ 2 domains (n = 119; 46%); (b) non-CI: z-scores in all domains > -1.5 (n = 52; 20%);

and (c) indeterminate: A z-score of ≤ -1.5 in only one domain (n = 90; 34%). The indeterminate group was excluded to reduce heterogeneity. The ANAM consists of 15 subtests and each has four scores (percentage correct [PCT], mean reaction time [MR], throughput [TP], coefficient of variation of reaction time [CV]). We generated 6 models using all 15 ANAM subtests and each subtest's score independently, and a combination of scores. Classification and regression tree (CART) analyses were used to assess validity of the ANAM against the ACR-NB and determine which ANAM subtests and scores best predicted CI. Of 171 patients, we randomly selected 70% for the training dataset and 30% for the testing dataset. Accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and AUC were recorded.

Results: Of 171 SLE patients, 70% had CI on the ACR-NB. From the CART analysis, Model 6 – a combination of all four scores [PCT, MR, TP and CV], yielded the best values from the training dataset. Accuracy, sensitivity, and specificity were 82%, 78% and 92%, respectively. PPV, NPV, and AUC were 96%, 65%, and 0.88 (95% CI: 0.82-0.94), respectively. Based on Model 6, the most important ANAM subtests [scores] for predicting CI were: code substitution delayed [PCT], repeated simple reaction time [CV], spatial processing [CV], matching to sample [CV], and code substitution delayed (CV). The accuracy of Model 6 on the testing dataset was 77% (95% CI: 0.63-0.88).

Conclusion: CART analysis results support the ANAM's utility as a screening tool for CI when benchmarked against the ACR-NB, with strong sensitivity (78%) and specificity (92%). The most predictive subtests [score] were code substitution delayed [PCT], repeated simple reaction time [CV], spatial processing [CV], matching to sample [CV], and code substitution delayed [CV]. Ian Watson Award for the Best Abstract on SLE Research by a Trainee

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Incidence, Prevalence & Mortality of Giant Cell Arteritis Over Time: A Meta-Analysis

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Objectives: Giant cell arteritis (GCA) is the most common large vessel vasculitis and exclusively affects individuals over 50 years old. This meta-analysis examined the geographical and temporal distribution of the incidence, prevalence and mortality of GCA.

Methods: A systematic review of the literature was conducted using the Embase, Scopus and PubMed databases. Articles were included if they were cohort or cross-sectional studies with 50 or more patients with GCA and reported on population, location and time frame parameters. Articles on mortality were included if they also mentioned standardized mortality ratio. Review articles, case-control studies and case series were excluded, as well as if articles were not in the English language. Two reviewers extracted data and a third verified inclusion of studies. Study quality was assessed by using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

Results: Of the 3569 citations identified by the literature search, 107 were included in analysis. The pooled incidence of GCA internationally was 10.00 [9.22, 10.78] cases per 100 000 people over 50 years old. This incidence was highest in Scandinavia 21.57 [18.90, 24.23], followed by North and South America 10.89 [8.78, 13.00], Europe 7.26 [6.05, 8.47], and Oceania 7.85 [1.48, 17.19]. Mortality rate was standardized across cohorts to units of deaths per 1000 people per year. Only 9 studies reported prevalence. Pooled prevalence from these 9 was 51.74 [42.04, 61.43] cases per 100 000 people over 50 years old. Overall, pooled mortality was 20.44 [17.84, 23.03] deaths/1000 per year. Mortality had a generally decreasing trend over the years of publication.

Conclusion: The incidence of GCA varies nearly 3-fold between regions. The reasons for this are likely genetic and possibly environmental.

Incidence and prevalence are important for planning costs of biologic treatment in GCA.

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Improvement in Walking in Patients with Cardiometabolic Disease After Total Knee Arthroplasty for Osteoarthritis

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Objectives: Knee osteoarthritis (OA) commonly clusters with cardiometabolic disease (CMD). Physical activity is important in the management of CMD to reduce risk of cardiovascular events and all-cause mortality. Painful knee OA however is an important cause of walking limitation. Total knee arthroplasty (TKA) is an effective treatment for knee OA; however, data on the impact of comorbidities on functional improvement in these patients is sparse. In patients with CMD, understanding the degree to which walking performance improves after TKA has important implications for their chronic disease management. The objective of this study was to assess the relationship between CMD and change in walking ability (performance-based and self-reported) after TKA.

Methods: Patients with knee OA were assessed one month prior to TKA. Standardized questionnaires assessed demographic (age, sex) and clinical (BMI, WOMAC pain score and KOOS physical function short form) characteristics, and comorbidities. Individuals who reported hypertension, diabetes, and heart disease were identified as having CMD. Participants performed a six-minute walk test (6MWT), and answered questions related to self-reported walking ability (ordinal variable), prior to and at 12 months following TKA. Repeated measures ANOVA and McNemar test assessed the between group differences in change in walking ability at 12 months following TKA. ANCOVA assessed the relationship between CMD and 6MWT performance at 12 months following TKA, adjusted for pre-operative 6MWT performance and potential confounders (demographic and clinical characteristics, and total morbidity count).

Results: 278 participants were included. Mean age was 67.1 (SD 8.5) years, 65.5% female, and 57.1% had CMD (diabetes 12.1%, hypertension 48.9%, heart disease 14.5%). Those with CMD were older, had higher BMI, and higher total morbidity count ($p < 0.001$). While pre-operatively, patients with CMD had lower objectively-measured walking performance assessed by 6MWT (310.7 [SD 97.1] m) compared to those without (341.3 [SD 111.9] m) ($p = 0.02$), absolute improvement in walking performance was similar between groups (CMD: 69.9 [SD 88.6] m vs. non-CMD: 74.9 [SD 95.0] m, $p = 0.65$). Additionally, improvement in self-reported walking ability at 12 months following TKA was similar in those with and without CMD ($p = 0.16$). Adjusting for potential confounders did not change our results.

Conclusion: In patients with CMD, surgical treatment of their symptomatic knee OA with TKA significantly improved both their objectively measured and self-reported walking performance. Treatment of knee OA is therefore an important means to improve walking ability in these patients where physical activity is important to address high cardiovascular risk.

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What Change in Six-Minute Walk Test Indicates a Clinically Meaningful Improvement in Mobility to Patients with Knee Osteoarthritis After Total Knee Arthroplasty?

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Objectives: Walking ability is instrumental to physical function, and improvement in walking ability is a primary reason patients with knee osteoarthritis (OA) seek total knee arthroplasty (TKA). Six-minute walk test (6MWT) is an excellent predictor of functional walking ability following TKA. Data estimating the minimal clinically important difference (MCID) are emerging, although no definitive estimates exist, and few studies have assessed the change in 6MWT after TKA that is meaningful to patients. The objectives of this study were, in patients with knee OA, to determine: 1) the relationship between self-reported change in walking ability at 12 months following TKA with change in walking performance measured by the 6MWT; and 2) the minimal threshold for improvement in 6MWT that is meaningful for patients.

Methods: Patients with knee OA were assessed one month prior to and at 12 months following TKA. Standardized questionnaires assessed demographic and clinical characteristics. Participants performed a 6MWT at both visits. At 12 months, patient-reported perceived change in walking ability was assessed as: not better (extremely, a lot or somewhat worse, or unchanged), better (a little or somewhat better), or much better (a lot or extremely better). Paired t-test compared 6MWT distance prior to and at 12 months following TKA. Kruskal-Wallis test compared the change in 6MWT distance across the three groups. We used the patient-reported criterion of walking a little or somewhat better to define the threshold for MCID, and then compared this anchor-based estimate to a distribution-based estimate using 0.50 of the pre-TKA standard deviation of 6MWT distance, corresponding to a "moderate effect".

Results: 278 participants were included. Mean age was 67.1 (SD 8.5) years and 65.5% female. Mean (standard deviation [SD]) pre-operative 6MWT distance was 323.1 (104.6) m, and mean (SD) distance at 12 months was 396.0 (111.9) ($p < 0.001$). Mean (SD) change in walking distance incrementally increased across the three groups: not better (n = 28): 29.5 (84.1) m; better (n = 45): 40.3 (86.3) m; and much better (n = 203): 86.6 (89.5) m ($p < 0.001$). The anchor-based MCID was 40.3 m. The MCID calculated using distribution-based method was 52.3 m.

Conclusion: In patients with knee OA, the threshold improvement in 6MWT distance after TKA that corresponded to reporting walking a little or somewhat better was 40 m. An anchor-based MCID may better assess what constitutes a minimum important change to patients compared to distribution-based methods.

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Incidence and Predictors of Heart Failure in Patients with Psoriatic Disease – A Cohort Study

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Objectives: Data about heart failure (HF) in patients with psoriatic disease (PsD) are sparse. The aims of the study were to: 1) determine the incidence and risk factors for HF in patients with PsD and 2) describe their electrocardiographic (ECG) and echocardiographic (TTE) findings.

Methods: A cohort analysis was conducted involving patients followed prospectively from 1978 to 2018 in the University of Toronto PsD cohort. Participants were assessed according to a standard protocol that included demographics, medications, measures of disease activity and comorbidities. The primary outcome was the first event of HF. HF events were further classified into ischemic and non-ischemic HF. Potential HF events were identified by searching the cohort database and linkage with provincial hospitalization and mortality databases. Patients with HF prior to study entry were excluded. The association between cardiovascular risk factors, features of disease activity and occurrence of HF events was assessed using Cox proportional hazard models. Chart reviews of medical records identified clinical, ECG and TTE findings.

Results: A total of 1994 patients with PsD with 22,437 patient years were analyzed. During the follow-up period, 64 new HF events occurred (38 ischemic, 26 non-ischemic). The incidence rate of first HF event during the study period was 2.85 per 1000 patient years. Of the 41 cases with available medical records, there were 19 cases of ischemic HF and 22 cases of non-ischemic HF. In all events, most common ECG findings were atrial fibrillation (22%), bundle branch blocks (29%) and pathological Q waves (33%). TTE revealed 37% reduced ejection fraction, 63% preserved ejection fraction, wall motion abnormalities (61%), and left ventricular hypertrophy (41%). In multivariate analysis, the following variables were independent predictors for all HF events: ischemic heart disease ($p < 0.001$), adjusted mean (AM)-tender joint count (TJC), AM-swollen joint count, AM-ESR, and HAQ (all $p < 0.05$). The strength of association of disease activity measures was higher when the analysis was restricted to non-ischemic HF as the outcome, with pain score, AM-TJC, AM-SJC, ESR and damaged joint count as independent predictors (all $p < 0.05$). The strongest predictor of ischemic HF was prior ischemic heart disease and additional independent predictors included: AM-ESR and HAQ ($p < 0.05$). Minimal disease activity state was protective for all HF and ischemic HF ($p < 0.05$).

Conclusion: Increased risk of HF is associated with a combination of traditional cardiovascular risk factors and disease activity, particularly in patients with non-ischemic HF. The effect of inflammation on HF may be partially independent of atherosclerotic disease.

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Severity and Predictors of Pain Intensity and Hand Disability in Patients With Trapeziometacarpal Osteoarthritis

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Objectives: Trapeziometacarpal osteoarthritis (TMO) is one of the most prevalent and painful forms of hand osteoarthritis. Yet, no study has exhaustively documented the characteristics of this pathology using a biopsychosocial approach (e.g., pain, disability, productivity, psychological well-being). Furthermore, radiographic TMO severity and symptomatology are only weakly to moderately correlated. The extent to which biopsychosocial factors (e.g., pain catastrophization, depression) contribute to interindividual variability in TMO pain/hand disability merits further investigation. Moreover, the management of osteoarthritis may include pharmacotherapy, rehabilitation, surgery, psychosocial interventions, and complementary/alternative methods. To date, no study has extensively documented healthcare resource use in TMO patients. We thus aimed at 1) describing the pain experience of patients with TMO from a biopsychosocial perspective, 2) examining the interrelationships between pain intensity, hand disability, and various biopsychosocial factors, and 3) documenting the types of treatment TMO patients employ and their use of healthcare resources.

Methods: A total of 227 TMO patients recruited from 16 healthcare institutions completed a questionnaire composed of well-validated scales and various clinical questions (online via SurveyMonkey or paper-pencil format). The associations of pain severity and hand disability with various biopsychosocial characteristics were analyzed by multivariable linear regression.

Results: The mean age of the participants was 62.6 ± 8.5 years and 78% were women. The mean pain intensity on the average in the last seven days was 5.8 ± 2.1 and the mean physical disability measured by QuickDASH, 45.4 ± 18.8. The mean physical and mental components of their quality of life (SF-12v2) were 41.0 ± 9.4 and 48.7 ± 9.7 respectively. Results of the multivariable linear regression analyses showed that age, pain frequency, pain catastrophization, depression and living condition accounted for 43.3% of the variance in pain intensity while age, sex, pain intensity, pain catastrophization, depression, education, employment status and living condition accounted for 60.6% of the variance in hand function. As for TMO management, acetaminophen, corticosteroid intraarticular injections, orthosis, hand massage, hand exercises and heat/cold application were used by more than one third of participants.

Conclusion: This comprehensive study showed that TMO patients experience pain of moderate to severe intensity which can affect various aspects of their daily living and their physical health-related quality of life. Since pain catastrophization and depression influence pain experience in TMO patients, psychological interventions aiming to reduce these factors may improve their clinical condition and efficacy of such interventions needs to be investigated.

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Mindfulness-Based Stress Reduction to Improve Depressive Symptoms and Rheumatoid Arthritis-Related Clinical Outcomes : Results from a Feasibility and Acceptability Trial

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Objectives: Despite available highly effective pharmacological treatments, up to 30% of rheumatoid arthritis (RA) patients remain in quasi-remission, where inflammation is controlled but patients still report unacceptable levels of negative impact of RA (PGA on a 0-10 visual analog scale (VAS)). PGA levels correlated with depressive symptoms assessed by Center for Epidemiologic Studies- Depression (CES-D) scores. Mindfulness-Based Stress Reduction (MBSR) is relatively inexpensive and reduces both anxiety and depression in several conditions. We completed a feasibility and acceptability study to pave the way for an eventual randomized controlled trial (RCT) of MBSR to improve depressive symptoms and clinical outcomes in RA patients in quasi-remission.

Methods: A standardized 8-week MBSR program in adults with controlled inflammatory disease (stable SJC at or below 2/66, normal CRP; stable treatments) but high CES-D scores (2 groups), high CES-D or anxiety scores (1 group), or PGA higher than Physician Evaluation of Disease Activity (EVA) by ≥ 2 (1 group). Feasibility was documented using process indicators. Outcomes were measured at baseline and 3 to 6 (median 4.1) months after the end of MBSR during regular clinical visits with the rheumatologist (SDAI; EVA), and by questionnaires on depressive symptoms (CES-D), HAQ, sleep (VAS), fatigue and pain (SF-36), anxiety (GAD-7), PGA. Qualitative interviews based on a theoretical framework of acceptability were conducted following the post-MBSR evaluation.

Results: We report on the first 21 patients assigned to intervention (mean age 59, 91% females). Factors leading to higher recruitment rates were 1) using pragmatic scores to identify eligible patients (e.g. EVA and PGA), 2) no formal clinical evaluation of mental health and no emphasis on

depression in the recruitment material. Despite the small sample size, MBSR had a highly significant positive impact on depressive symptoms (p = 0.003) and anxiety (p = 0.03), as well as trends (p < 0.1) on quality of sleep and HAQ. Of the 13 participants who completed a qualitative interview; most reported that MBSR helped them control their reactions to daily stressful situations. Perceptions were almost uniformly positive towards MBSR, and most appeared to have integrated some part of it in their daily life.

Conclusion: Although recruitment was challenging, a MBSR trial in RA patients in quasi-remission was found acceptable and feasible. Positive impacts on mood and on clinical outcomes were observed. Depression scores appear the most sensitive to change and are recommended as the primary outcome for an eventual RCT. MBSR added to conventional treatments might help empower RA patients towards self-management. Supported by a CIORA Grant.

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Earlier Biologic Initiation Over Two Decades of Real World Observational Data From the RAPPORT Biologics Registry of Northern Alberta, Canada

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Objectives: Rheumatoid (RA) and psoriatic arthritis (PsA) are inflammatory arthritides associated with significant potential functional disability if not well controlled. We reviewed the baseline demographic and disease characteristics over nineteen years in the RAPPORT registry to understand changes in prescribing patterns of biologic disease modifying anti-rheumatic drugs (bDMARDs) over time.

Methods: The Rheumatoid Arthritis Pharmacovigilance Program and Outcomes Research in Therapeutics (RAPPORT) registry is a large prospective inception cohort of Northern Albertan inflammatory arthritis (IA) patients about to start advanced therapy with at least 4 months of exposure to conventional synthetic DMARDs (csDMARD) including parenteral weekly methotrexate, methotrexate plus a DMARD in combination, and leflunomide. We compared baseline demographic and disease characteristics in two cohorts according to registration year: 2000-2010 (n = 1071) and 2011-2019 (n = 1632). Specifically, we compared patient demographics including age, sex, education, comorbidities, and smoking status; disease characteristics including tender and swollen joint count, health assessment questionnaire (HAQ), patient global assessment, CRP, DAS28, symptom duration, and disease duration; and first bDMARD therapy. Descriptive statistics were used to assess baseline demographics along with univariate analysis for comparison of variables between cohorts.

Results: Of the 2703 RAPPORT patients, IA patients in the later cohort (2011 onwards) were started on biologic therapy an average of 2.61 years earlier from symptom duration (p < 0.01). There were differences in the pattern of bDMARD prescriptions within and between classes between the two cohorts; however, there were no significant differences in age (p = 0.16) or sex (p = 0.91). The prevalence of self-reported depression was higher in the later (24.7%) versus earlier cohort (20.3%; p = 0.02) but there was no difference in heart disease or associated cardiovascular risk factors including hypertension (p = 0.73) and diabetes (p = 0.35). Statistically significant differences in markers of disease activity including HAQ (1.58 vs 1.42, p < 0.01), swollen joint count (8.10 vs 7.10, p < 0.01), and DAS28CRP (4.63 vs 4.53, p = 0.02) were found between cohorts. Biologic DMARD prescriptions in the later cohort showed increased TNF inhibitor use (81.5% versus 76.28%) and increased use of other classes of bDMARDs.

Conclusion: Prescribing patterns in RAPPORT changed between the first and second decade that bDMARDs were available with earlier introduction of bDMARDS in IA patients from time of diagnosis. Possible reasons include the rapid increase in availability of bDMARDs between and across classes and increased uptake and confidence in bDMARD use by prescribing rheumatologists over time. Further work to evaluate the impact of bDMARD prescription patterns on patients and society is planned.

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Use of Chest Radiograph in Screening for Aortic Structural Damage in Patients with Giant Cell Arteritis

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Objectives: Giant cell arteritis (GCA) has a strong predilection for the thoracic aorta, where inflammation may cause aortic structural damage (ASD). Periodic screening for ASD is recommended, however, the optimal screening method remains unknown. We aimed to assess practice patterns for ASD screening at a single Canadian centre, and to determine the utility of chest radiograph (CXR) for ASD detection in patients with GCA.

Methods: Electronic records of patients with GCA seen by Rheumatologists at the University of Alberta between April 2012 and December 2017 were retrospectively reviewed. Patients meeting ACR 1990 classification criteria for GCA were included. A standardized database (Redcap) was used to record patient demographics, symptoms, imaging results, and outcomes. The frequency and results of CXR and advanced imaging (AI) studies (including CTA, MRA, and PET/CT) performed over time were recorded. Analysis was completed using Excel.

Results: Of 133 GCA patients, 81 met inclusion criteria (64% female, mean age 71 years +/- 8.4). In total, 70 (86%) of GCA patients had imaging available: 43 had CXR alone, 20 had both CXR and AI, and 7 had AI alone. Baseline CXR results were available for 63 (78%) patients, and identified aortic abnormalities in 14 (22%) patients at mean 8.53 (+/- 14.96) months from diagnosis, including tortuosity of the aorta (8, 13%), widened mediastinum (3, 5%), ectasia (2, 3%), and thoracic aortic aneurysm (1, 1.6%). Throughout mean follow-up of 27.6 (+/- 27.3) months, patients underwent an average of 2.4 (+/- 1.85) CXR studies. During this time, aortic abnormalities were detected in 5 additional patients (19 total, 30.2%). Advanced imaging (AI) studies were available in 27 (33.3%) patients. Of those with AI available, 3 patients (11.1% of those with AI, 3.7% total cohort) had confirmed aortic dilatation. Of the 20 patients with both CXR and AI available, 5 patients had an abnormal CXR, and 2 had aortic dilatation on AI. Using AI as the gold standard, CXR had a sensitivity of 100%, and specificity of 83% for detecting ASD.

Conclusion: Practice patterns for screening for ASD in GCA patients are highly variable. CXR suggested aortic abnormalities in 30% of patients by 2 years, but few had AI available for comparison. In this small number of patients with both CXR and AI, CXR had a high sensitivity and moderate specificity for the detection of thoracic aortic dilatation, suggesting it may be useful as an initial screening test. Further prospective study directly comparing both modalities is warranted.

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Development and Test of a Self-administered Questionnaire for Adults With Osteoporosis to Detect Familial Forms of Osteoporosis and/or Atypical Femur Fractures in Clinical Practice

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Objectives: Atypical femur fractures (AFF) are insufficiency fractures characterized by subtrochanteric or diaphyseal location, frequently bilateral, lateral cortex in origin, with a transverse fracture line and periosteal reaction. The incidence of AFF has increased with prolonged bisphosphonate (BP) use but this rare complication may also have a genetic component. The first aim of this study was to develop a bilingual self-administered questionnaire for adults with osteoporosis to recognize familial forms of osteoporosis possibly at increased risk of AFF. The second aim was to evaluate this questionnaire in a subgroup of participants from the Quebec Registry for AFF.

Methods: After review of the literature and in collaboration with clinician-experts, we developed a 14 item questionnaire to assess the following information: familial history of fractures, familial osteoporosis without fractures, dental anomalies, cleft palate, joint hypermobility, small stature, ocular or digital anomalies, bone deformities, deafness and intellectual delay. The questionnaire was circulated to patient-partners to adjust the level of literacy. We then administered this questionnaire to a subgroup of participants from the Quebec Registry for AFF. We compared the AFF characteristics (location, incomplete versus complete fracture, age at occurrence, period of BP use) in different subgroups, namely familial forms of AFF or not, familial forms of osteoporosis with or without history of fractures. Statistical analyses relied on Student t tests for continuous variables, and Chi-square or Fisher's exact tests, when appropriate, for nominal values. P-value less than 0.05 was considered as statistically significant.

Results: Forty-four patients with AFF from the Registry answered the questionnaire (response rate of 63.4%). Half of the participants with AFF had a family history of osteoporosis, and 41% had a family history of osteoporotic fractures. Four participants (9%) had a family history of AFF. The mean age of AFF occurrence was younger in patients with a familial form of AFF versus patients without AFF family history (64 ± 4 years versus 71 ± 7 years, p = 0.046). All participants with AFF having a familial form of osteoporosis without fractures reported a personal or first degree relative with teeth loss versus 15% of patients without a familial form of osteoporosis without fractures (p = 0.0015).

Conclusion: We have developed and administered a questionnaire which allowed us to determine that 50% of patients with AFF had a family history of osteoporosis and 9% had a familial form of AFF. This tool could help identify patients at risk of AFF within the osteoporosis population.

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Joint Improvements in Upper and Lower Extremities in Subjects With Psoriatic Arthritis Treated With Apremilast 30 mg BID for 52 Weeks in 3 Pooled, Randomized Controlled Studies

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Objectives: Apremilast has been effective in improving psoriatic arthritis (PsA) joint symptoms, based on swollen and tender joint counts (SJC and TJC), but its effect on specific joints has not been assessed. Effects on weight-bearing joints may be of particular concern in PsA (Imagama T, et al. Curr Rheumatol Rev. 2017;13:37-42), given that rates of obesity are higher in PsA patients (Merola JF, et al. RMD Open 2018;4:e000656). Improvements in these joints may be associated with greater benefits, including quality of life. This analysis evaluated the effect of apremilast treatment on individual joints, particularly those of the lower extremity that are weight bearing, in PsA subjects from the pooled PALACE 1-3 studies.

Methods: The multicenter, randomized, double-blind, placebo-controlled PALACE 1-3 studies had similar design and enrolled subjects with active PsA despite prior treatment with conventional disease-modifying anti-rheumatic drugs and/or biologics. The current analysis included all PALACE 1-3 subjects receiving apremilast 30 mg BID from baseline who had SJC and TJC data available at Week 52. Mean percent changes from baseline to Week 52 were calculated for SJC and TJC based on joints of the upper and lower extremities. Proportions of subjects with swelling or tenderness in each joint at baseline and Week 52 were also calculated. Data are presented as observed.

Results: In total, 376 subjects receiving apremilast 30 mg BID from baseline and having Week 52 data were included in the analysis (mean age: 50.9 years; female: 55.3%; mean SJC: 12.7; mean TJC: 23.4; mean Clinical Disease Activity Index for PsA [cDAPSA] score: 42.2). Overall mean SJC and TJC improvements from baseline to Week 52 were –62.8% and –49.0%, respectively. At Week 52, the mean cDAPSA score was 21.5, which was equivalent to a –46.7% improvement from baseline. Upper and lower extremities showed the same degree of mean improvements for both swollen and tender joints (SJC: –60.4% [upper] and –59.5% [lower]; TJC: –45.8% [upper] and –46.7% [lower]). Both swelling and tenderness were present in lower proportions of patients at Week 52 compared with baseline for each joint assessed.

Conclusion: Consistent with previously reported benefits of apremilast in reducing overall SJC and TJC in PsA subjects, this analysis from the pooled PALACE 1-3 studies demonstrated that treatment with apremilast for 52 weeks was associated with consistent reductions in joint swelling and tenderness in both upper and lower extremity joints and when analyzed by individual joints.

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Long-Term Safety of Filgotinib in Patients with Psoriatic Arthritis, Week 52 Safety Data from a Phase 2 Open-Label Extension Study

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Objectives: Filgotinib (FIL), an oral, selective Janus kinase 1 inhibitor in development for psoriatic arthritis (PsA) was evaluated for efficacy and safety in patients with active PsA in a 16-week, phase 2 study (EQUATOR). After 16 weeks, patients could enroll in an open-label extension (OLE) study (EQUATOR2) to evaluate long-term safety and efficacy. This analysis was to assess safety and efficacy through 52 weeks of exposure to FIL.

Methods: Patients who completed the 16-week randomized, double-blind, placebo (PBO)-controlled study were eligible for participation in the OLE where they received once-daily (qd) open-label FIL 200mg. The interim safety analysis includes all data from screening in the core study to the data cut of 18 April 2019 in the OLE. The efficacy analysis includes all data until Week 52 (observed case analysis).

Results: Of the 131 EQUATOR patients, 124 (95%) completed the study and 122 (93%) enrolled in EQUATOR2; 50% were female and mean age was 50. At this interim analysis, 106/122 (87%) remained in the OLE (premature discontinuations: 4 safety, 11 withdrew consent, 1 other reasons). Cumulative patient years of exposure (PYE) on FIL: 160; median time on FIL: 66 weeks. Rate of treatment-emergent adverse events (TEAEs): 213.9/371.0, rate of serious TEAEs: 5.6/5.0 in the FIL and PBO arms, respectively. In the FIL arm TE infections rate: 62.5, and in the PBO arm: 100.3. Rate of key AEs of FIL compared with PBO were, malignancy 0.6 vs 0, herpes zoster 0.6 vs 0 and major adverse cardiac events (adjudicated) 0.6 vs 0, respectively. One patient in the FIL arm died due to pneumonia on Day 106 in the core study. Key ≥ Grade 2 TE laboratory abnormalities seen with FIL arm (N = 128) compared with PBO (N = 66) were lymphocyte decrease 11.1% vs 4.5%, neutrophil decrease 5.5% vs

0%, alanine transaminase increase 1.6% vs 1.5% and creatinine increase 0.8% vs 0%, respectively. All AE results are per 100 PYE. At Week 52, 34% of the patients fulfilled criteria for minimal disease activity and 81%, 55%, and 33% of patients, respectively, achieved ACR20/50/70 responses.
Conclusion: FIL 200mg qd was generally well tolerated and the safety profile in PsA was comparable to that observed in the FIL rheumatoid arthritis studies. The data from this interim analysis suggest that further improvement of the patient condition can be expected beyond 16 weeks of treatment.

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Barriers to Medication Adherence and Degree of Nonadherence in a Systemic Lupus Erythematosus (SLE) Outpatient Population

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Objectives: Many patients with systemic lupus erythematosus (SLE) do not adhere to their medications. However, the reasons for nonadherence are not clear. We aimed to estimate the level of medication adherence and barriers to adherence among the patients attending the Lupus Clinic.
Methods: All patients were taking at least one medication to treat SLE including antimalarial, immunosuppressive, or glucocorticosteroid therapeutic classes. Adherence was measured using the Medication Adherence Self-Report Inventory (MASRI). Pill counts were conducted in a proportion of participants. Barriers to medication adherence were identified using the Identification of Medication Adherence Barriers Questionnaire (IMAB-Q). Patients were defined as nonadherent with adherence rates < 80% or sufficiently adherent with adherence rates ≥ 80%. Descriptive statistics were used to analyze data.
Results: A total of 95 patients were recruited to the study and 28 pill counts were conducted. The mean age of participants at the time of study was 46.8 years, female:male ratio was 9:1, and mean disease duration was 17.9 years. The mean medication adherence rate for the SLE patients was 90.8%, based on the MASRI visual analog scale. Ten patients were classified as nonadherent and 85 patients were classified as sufficiently adherent. Adherence rates were corroborated by the pill counts. Important barriers to medication adherence were: negative emotions (e.g. frustration, embarrassment, anger) about taking medications as prescribed (21.3%), concern about harmful medication side effects (64.2%), changes to daily routines interfering with taking medications (20.7%), and medications being an unwelcome reminder of their condition (23.7%). Patients defined as nonadherent reported significantly more barriers to medication adherence than patients defined as sufficiently adherent, based on IMAB-Q total scores (p < 0.001). Specific barriers to medication adherence that were experienced by nonadherent participants significantly more often, included: being easily distracted from taking medications as prescribed (p < 0.001), remembering to take medications as prescribed (p < 0.001), having a system in place to help order, collect, and take medications as prescribed (p < 0.001), taking medications as prescribed not fitting in their daily routine (p < 0.001), and life getting in the way of taking medications as prescribed (p = 0.002).
Conclusion: The adherence rate in our population was higher than expected, reaching 90% on the MASRI, confirmed by pill count. A number of barriers to medication adherence were identified. These barriers to medication adherence need to be addressed on an individualized basis to improve patient outcomes.

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Delay of Consultation in the Psoriatic Arthritis Program

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Objectives: The 2014 Update of the Canadian Rheumatology Association/ Spondyloarthritis Research Consortium of Canada Treatment Recommendations for the Management of Spondyloarthritis recommended that patients at risk of peripheral spondyloarthritis, such as PsA, be assessed by a rheumatologist within 6 weeks of referral. Several studies clearly indicate that a delay diagnosis can lead to worse patient outcomes for PsA; however, there is little research on the delay between referral and assessment by a rheumatologist and whether the wait time recommendation is being met. This project aimed: 1) to investigate the proportion of patients with PsA who are assessed by a rheumatologist within 6 weeks of referral to the PsA Program at Toronto Western Hospital (TWH) and 2) to investigate the possible reasons for delays in consult with a rheumatologist.
Methods: We identified patients with PsA who were referred to and seen by a rheumatologist at the PsA Program between January 2013 – May 2019. We used retrospective chart reviews of medical records and referral letters to determine the number of days between referral and assessment by a rheumatologist. The causes for delays for each patient were identified as no spots in the clinic, or patient unable to make the scheduled appointment.
Results: Among 162 patients identified, 42 (25.9%) patients were seen within 6 weeks of referral. The median wait time was 77.5 days (IQR 79.25). Wait times varied with urgent referrals and geographical distance: patients who were urgently referred were more likely to be seen within 6 weeks (p = 0.035, Fisher's exact test), and the median distance of the referring physicians of patients seen within 6 weeks was lower than those seen after 6 weeks, with a marginally significant difference (p = 0.059, Kendall's tau test). The most common cause of delay was the lack of spots in the PsA Program, while 21 (13.0%) patients rescheduled to a later date, although rescheduling was not significantly associated with wait time. The wait time was also not significantly associated with the patient's age or sex, or referring physician specialty.
Conclusion: The majority of PsA patients at the TWH PsA Program did not meet the wait time recommendation. The most common factor that prevented a timely consultation with a rheumatologist was the lack of spots in the PsA Program. Greater access to rheumatologists is needed to improve the timely and effective care of patients with PsA.

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Frequency and Determinants of Delayed Start of Golimumab Therapy in Rheumatoid Arthritis Patients and Impact on Outcomes

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Objectives: Biologic initiation by RA patients followed in routine clinical care is often delayed due to unfamiliarity with utilization management criteria and lag in prescription filling, which could lead to suboptimal treatment outcomes. This analysis aimed at describing the time elapsing between prescription and injection of golimumab treatment in Canadian real-world, identifying patient and physician determinants of such delays, and assessing the potential impact on treatment outcomes.
Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients initiating treatment for RA with subcutaneous golimumab were included. Predictors of delayed administration were explored among physician (site region: Western [Alberta, British Columbia, Saskatchewan], Ontario, Quebec and Maritimes; location: rural vs. urban) and patient (age tertiles, gender, disease duration tertiles, CDAI tertiles, prior biologic experience, and type of insurance coverage [private vs. public vs. other]) characteristics using the independent-samples median test and multivariate generalized linear models. The impact of injection delays on outcomes was assessed with logistic regression adjusting for age, gender, and baseline levels.
Results: 530 patients were included with a mean (SD) age of 57.7 (13.0) years and disease duration of 8.0 (8.3) years, and the majority being

bio-naive (86.2%) and seen in Ontario (62.8%) and urban areas (98.1%). Median time to first golimumab injection from baseline was 4.1 weeks (interquartile range: 4.4) with 159 (30%) of patients experiencing no delay (zero days). In univariate analysis, median time to first injection was significantly shorter (p = 0.002) in Quebec (1.6 weeks) compared to the remaining regions (4-4.3 weeks); no differences were observed across age tertiles (p = 0.173), gender (p = 0.185), disease duration tertiles (p = 0.150), CDAI tertiles (p = 0.065), prior biologic experience (p = 0.313), site location (p = 0.750), and type of insurance coverage (p = 0.158). In multivariate analysis, upon mutual adjustment, disease activity was identified as the single significant independent predictor of delayed golimumab administration with patients in the highest CDAI tertile showing the shortest time to first injection (0.4 weeks vs. 3.5 weeks in mid-tertile vs. 2.8 weeks in low tertile). Delayed time to golimumab administration was associated with significantly lower odds of SDAI remission at 12 months (OR [95%CI]: 0.89 [0.80-0.99]) and a trend towards lower odds of CDAI LDA at 12 months (0.98 [0.95-1.00].

Conclusion: These results indicate that delays exist among RA patients in the first dose of golimumab following prescription which were significantly higher among patients with lower disease activity. Longer time to administration was associated with poorer outcomes.

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Prediction of Hospitalizations in Systemic Lupus Erythematosus Using a Frailty Index

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Objectives: The Systemic Lupus International Collaborating Clinics (SLICC) frailty index (FI) predicts mortality and organ damage accrual in patients with systemic lupus erythematosus (SLE). However, the association of the SLICC-FI with hospitalizations in SLE has not been described. The objective of this study was to estimate the association of baseline SLICC-FI values with the rate of hospitalizations during follow-up in the SLICC inception cohort.

Methods: Patients fulfilling ≥ 4 ACR classification criteria for SLE were recruited within 15 months of diagnosis and were assessed annually for medication use, comorbidities, disease activity [SLE disease activity index 2000 (SLEDAI-2K)], organ damage [SLICC/ACR Damage Index (SDI)], health-related quality of life [Short-Form 36 (SF-36)] and hospitalizations. For this analysis, we established a baseline dataset consisting of the first visit for which both SDI and SF-36 data were available. The SLICC-FI includes 48 health deficits related to organ damage, disease activity, comorbidities, and functional status. Using baseline data, we calculated a SLICC-FI score for each patient. The number and duration of inpatient hospital admissions during follow-up were recorded. Multivariable negative binomial regression estimated the association between baseline SLICC-FI values and the rate of hospitalizations per patient-year of follow-up, adjusting for relevant demographic and clinical variables. Model fit was evaluated using likelihood ratio (LR) tests and Akaike information criterion (AIC) values.

Results: The 1,549 SLE patients (84.8% of the cohort) eligible for this analysis were mostly female (88.7%) with mean (SD) age 35.7 (13.3) years and median (IQR) disease duration 1.2 (0.9-1.5) years at baseline. Mean (SD) baseline SLICC-FI score was 0.17 (0.08). During a mean (SD) follow-up interval of 7.2 (3.7) years, 614 patients (39.6%) experienced a total of 1570 hospitalizations. Patients classified as frail at baseline (SLICC-FI > 0.21) had a significantly higher rate of hospitalizations during follow-up compared to non-frail patients [Incidence Rate Ratio (IRR) 1.90, 95% CI 1.54-2.33]. Higher baseline SLICC-FI values (per 0.05 increment) were associated with an increased rate of hospitalizations during follow-up (IRR 1.21; 95% CI 1.13-1.30), after adjusting for age, sex, ethnicity/region, baseline disease duration, baseline SLEDAI-2K, baseline SDI, and baseline

use of corticosteroids and immunosuppressives. The addition of the baseline SLICC-FI to the multivariable model was associated with significant improvement in model fit [LR test statistic 35.56 (p < 0.001)] and relative predictive quality (change in AIC = 3880.30 – 3913.86 = -33.56).

Conclusion: The SLICC-FI predicts future hospitalizations among SLE patients and provides additional prognostic information compared to existing SLE measures.

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Development and Pilot of Novel Process Using Machine Learning and Crowd-Sourcing to Conduct a Living Systematic Review of Rheumatoid Arthritis Drug Therapy

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Objectives: To develop and pilot a novel approach for identifying and extracting data on randomized clinical trials (RCTs) for disease-modifying anti-rheumatic drug (DMARD) therapy in rheumatoid arthritis (RA). The aim was to improve the efficiency of maintaining living evidence reviews to inform Clinical Practice Guidelines.

Methods: We developed a process for the efficient identification and data abstraction of RCTs of RA drug therapy. Results from a literature search in indexed databases combining filters for 'rheumatoid arthritis' and 'randomized trial' were first filtered through a validated machine-learning algorithm. Records with a < 1% probability of being an RCT were excluded. The remaining records were uploaded to Cochrane Crowd, a citizen science platform, to further exclude records that were not RCTs. Included records from this step were then classified into the appropriate clinical populations of DMARD-naïve, DMARD-inadequate response, biologic/targeted synthetic DMARD-inadequate response, using a custom online annotation tool by a crowd of reviewers we invited centrally. The risk of bias assessment and data extraction for 11 outcomes at multiple time-points was conducted in duplicate by a team of reviewers, using an online data extraction platform (Covidence). To foster consistency, webinar teaching sessions were provided monthly to answer frequently asked questions and clarify instructions.

Results: Through our machine-learning and crowd-sourcing approach, 5000 records were assessed for eligibly and classified into their respective PICOs during a timeframe of four months. A total of 28 participants were involved, and the majority were medical trainees worldwide. A select group of 7 international reviewers were invited to conduct data extraction and risk of bias assessment during the pilot. Reviewers were trainees who had received detailed teaching material explaining the tasks and were evaluated on the accuracy of results in the pilot test. Thirty records from the biologic/targeted synthetic DMARD-inadequate response were assessed in duplicate, and results were validated within four months. During this time, 80 records from the DMARD-naïve response were also completed in duplicate and validated by 2 reviewers working full-time. Initial progress of PICO annotation improved remarkably upon the use of Cochrane classmate, which allowed regular tracking of progress and a breakdown of individual contribution.

Conclusion: A combined machine learning/crowd-sourcing approach is feasible for identifying and extracting data of RA drug therapy. This should facilitate the sustainability of living systematic reviews and guidelines over time and provides a mechanism of engaging trainees in the process. Best Abstract by an Undergraduate Student Award

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Real-World Treatment Patterns with Methotrexate over a Decade (2007-2017): Durability of Initial Subcutaneous Optimal Dosing Demonstrated in a Large Single-Center Interprofessional Early Rheumatoid Arthritis Clinic

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Objectives: To assess durability of subcutaneous Methotrexate (scMTX) in our clinic setting. As a large community-based interprofessional arthritis outpatient program with 30 years of proven clinical excellence, we are a team of rheumatologists, pharmacists, occupational therapists, physical therapists, kinesiologist, social worker and dietitian. Our program is unique in three ways. First, we have had dedicated program pharmacists since inception. They are 'counsellors and coaches', addressing patients' beliefs and fears about disease and medications. Secondly, we administer MTX almost exclusively subcutaneously, with demonstrated effectiveness and tolerability. Lastly, over those 10 years, we have utilized a tailored approach to manage MTX intolerance including vitamin B12 co-prescription if necessary.

Methods: The present study described trends in scMTX use and durability in a large single site early RA clinic from Jan 2007 to Mar 2017, part of the Canadian Early Arthritis Cohort (CATCH), a prospective observational cohort study. Our analysis included patients with active RA who initiated scMTX within 90 days of baseline entry and had at least 12 months of follow up. Descriptive statistics were used to summarize MTX starting dose, persistence, remission rates and biologic penetration.

Results: Of the 477 early RA patients enrolled at this single site over 10 years, 211 (44%) initiated scMTX within 90 days of baseline and had 12 months of follow-up. Only 9 patients initiated oral MTX and they were excluded in analysis. The mean starting dose of scMTX was 23 mg, 153 (73%) as monotherapy and 48 (23%) in combination with other csDMARDs. Vitamin B12 was co-prescribed in 158 (75%) patients; subcutaneously in 110 (70%) and orally in 48 (30%). The use of scMTX remained high over time: 201/211(95%) at 6 months, 175/211(83%) at 12 months, 124/173(72%) at 24 months and 95/146(65%) at 36 months. Conversely, the use of biologic or targeted synthetic DMARDs was low, with only 2 patients (1%) on biologic therapy at 36 months. There were 68%, 76% and 75% of patients in DAS28 low disease activity at 12, 24 and 36 months respectively.

Conclusion: A multifaceted and interprofessional approach for optimizing use of scMTX in early RA in our single center was associated with high rates of MTX persistence, low use of biologic therapy and similar treatment outcomes to other published studies. Further research is required to evaluate the individual aspects of our management approach, including the model of care and role of vitamin B12 co-prescription.

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Characteristics of Patients with Granulomatosis with Polyangiitis with Persistent ANCA Positivity and/or Hematuria at 12 Month Follow-up in a Canadian Cohort

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Objectives: Previous studies have identified proteinase 3 (PR3)-antineutrophil cytoplasmic antibody (ANCA) positivity at diagnosis and remission, and persistent hematuria at remission as risk factors for relapse in ANCA-associated vasculitis, but with more controversial results in granulomatosis with polyangiitis (GPA). This study sought to analyze the ANCA status and frequency of persistent hematuria at 12 months follow-up in a cohort of patients followed at the Toronto vasculitis clinic.

Methods: Demographic, clinical, and biological data were extracted from the CanVasc database for all GPA patients followed at the Toronto vasculitis clinic and with ANCA and hematuria status at month 12 ± 3 (M12). Their characteristics prior to and until M12 were analyzed. Relapse was defined as recurrence or new onset of disease due to active vasculitis after a period of remission, requiring change in dose of glucocorticoids and/or addition of another immunosuppressant.

Results: Of the 234 patients in the database, ANCA status at 12 ± 3 months follow-up was available for 116 patients; 113 had a follow-up exceeding 24 months. At diagnosis, the demographics and disease characteristics of these 113 patients were similar between those 50 ANCA+ or 63 ANCA- patients at M12. Cyclophosphamide was used for induction in 27 patients who were ANCA+ at M12 vs. 40 ANCA- patients (P = 0.31); rituximab was used in 2 and 4 patients, respectively (P = 0.69). At M12, maintenance treatments were not significantly different, with prednisone plus azathioprine used in 28 and 31 patients (P = 0.57), methotrexate in 10 and 16 patients (P = 0.65), and rituximab in 3 and 6 patients (P = 0.30), respectively. Of the 99 patients who were ANCA+ at diagnosis, 51 patients became ANCA- at M12, 38 patients remained PR3-ANCA+, and 6 patients remained MPO-ANCA+. Two patients ANCA- at diagnosis became MPO-ANCA+ at M12. At M12, 89% of patients were in remission (39% ANCA+, 50% ANCA-, P = 0.76). However, 17 (15%) patients ANCA- at M12 had a relapse prior to M12, compared to 6 (5.3%) patients ANCA+ at M12 (P = 0.05); of those, 19 were ANCA+ at diagnosis and 4 were ANCA-. In both groups, 11% patients had persistent hematuria at M12 (P = 0.67).

Conclusion: Patients with ANCA+ or ANCA- and/or persistent hematuria at M12 had similar characteristics at diagnosis. The only difference was a lower relapse rate prior to M12 in those ANCA+ at M12, compared to those ANCA- at M12, possibly due to the effect of re-induction treatment for the relapses. The predictive value of M12 ANCA status for subsequent relapses is currently under analysis.

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Personalized Therapy During Pre-conception and Gestation in SLE: Usefulness of 6-mercaptopurine Metabolite Levels With Azathioprine

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Objectives: Although azathioprine is the immunosuppressive of choice in SLE pregnancies, no one has evaluated 6-mercaptopurine (6-MP) metabolite levels in this population. We evaluated 6-MP metabolite levels in SLE women taking azathioprine during the pre-conception and/or gestational periods.

Methods: We performed a retrospective assessment of SLE women 18-40 years with at least one McGill Lupus Cohort annual study visit, between 01/2017-07/2019. Among all females on azathioprine who were pregnant or trying to conceive, we identified those with 6-MP metabolite levels available during this interval. We characterized patients with undetectable, low, or normal 6-thioguanine (6-TG) levels, as well "shunters" (low 6-TG with high 6-methylmercaptopurine, at risk for toxicity and treatment failure), using reference ranges for inflammatory bowel diseases, since none exist for SLE. We summarized key clinical characteristics (prior lupus nephritis, disease activity, pregnancy outcomes) of these patients.

Results: Among 29 SLE women of reproductive age using azathioprine over the study period, eight were pregnant or trying to conceive. Of these, six had 6-MP metabolite levels performed at least once. All except one had prior lupus nephritis and all had quiescent disease over the study interval. Half (3/6) of the women were planning to conceive, while the other half (3/6) conceived. In most (5/6), 6-TG levels were below the normal range. Among these, three patients had non- or barely detectable levels, despite appropriate drug dosing, suggesting non-compliance; two of these were pregnant at the time of measurement. One patient was determined a "shunter" and was thus switched to tacrolimus in planning for conception. Only one patient had 6-TG levels within the normal range, while trying to

conceive. Of the three pregnancies, one had no adverse outcome (despite low 6-TG), one was complicated by preeclampsia and preterm birth (with non-detectable 6-TG), and one pregnancy is still ongoing (barely detectable 6-TG, which will be addressed at her next follow-up).

Conclusion: Despite small numbers, our study is the first to assess 6-MP monitoring in SLE women prior to conception and during pregnancy. We highlighted key opportunities to personalize therapy during this critical period. In particular, identification of "shunting" helps avoid unnecessary and potentially harmful dose escalation. We also observed a substantial number of non-compliant patients, stressing the need to discuss adherence. These findings prompt further research on thiopurine metabolism to allow more personalized therapeutic approaches in this vulnerable population.

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Drug Retention of Tumor Necrosis Factor Inhibitors Compared to Janus Kinase Inhibitors in the Treatment of Rheumatoid Arthritis

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Objectives: Tumor necrosis factor inhibitor (TNFi) therapies are most commonly used for patients who failed conventional synthetic disease-modifying antirheumatic drugs (sDMARDs). Janus kinase inhibitors (JAKi) have promising data for the treatment of RA. Drug survival may be considered a reliable indicator of overall treatment effectiveness, safety and tolerability in observational registries. Additionally, line of therapy affects retention (first advanced therapy in general is taken for a longer time than post TNFi failure and the worst retention is usually multi-drug failure patients). The aim was to examine the short-term drug survival in a population-based cohort of RA patients who received a TNFi or a JAKi comparing the discontinuation rates between these two groups.

Methods: Patients must have been or currently are being treated with either a TNFi or JAKi and must have been assessed within a four-year period between September 2014-2018. In this retrospective study, patient charts were reviewed from the Rheumatology department and patients were selected if they met the eligibility criteria. University of Western Ontario ethics approval was obtained.

Results: There were 298 patients (82.9% female, mean age 60.1 years, disease duration 15.8 years), with total of 365 patient encounters. Most of the TNFi use was etanercept (63.4%), adalimumab (25.3%), and Certolizumab (7.9%) while 99% of JAK inhibitor use was from tofacitinib. In this study, combining all lines of therapy, patients started on TNFi appeared to have better retention when compared to JAKi group at one year (66% on TNFi and 34% for JAKi, p < 0.001). Among patients with first biologic therapy, drug survival at one year was significantly better for the TNFi group compared to the JAKi (92.6% vs 71.4%, p < 0.001). Among patients that had previously discontinued biologic therapy, drug survival at one year was not statistically different ([TNF 4.08] vs [JAK 0.78], chi squared p = 0.07). Considering all patient biologic combinations, the drug survival of TNFi was superior to JAKi. This is not consistent with previous studies however the sample size was limited overall. Additionally, the sample size of the JAKi group was skewed more to recent use resulting in many active users who were not yet at one year.

Conclusion: More data are needed to determine if there are retention differences between the two groups over a longer observation period.

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Differences Between Early and Established Rheumatoid Arthritis in Time to Achieving CDAI but Not Fatigue Low Disease Activity and Remission: Data from the OBRI Registry

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Objectives: Previous studies have shown that early diagnosis and treatment of rheumatoid arthritis (RA) is important for achieving comprehensive disease control and have identified established disease as an independent predictor of worse clinical outcomes. However, it is not clear whether these differences are driven by patient-reported or objective outcome measures. The aim of this analysis was to compare the time to achieving low disease activity (LDA) and remission based on both objective and patient-reported outcomes in people with early vs. established RA followed in routine clinical care.

Methods: RA patients enrolled in the Ontario Best Practices Research Initiative (OBRI) registry that were not in a low disease state at baseline based on the CDAI, SJC28, PtGA, pain and fatigue criteria below, and had at least six months of follow-up, were included in the analysis. LDA was defined as CDAI ≤ 10, SJC28 ≤ 2, TJC28 ≤ 2, PtGA ≤ 2cm, pain ≤ 2cm, fatigue ≤ 2cm, and MDGA ≤ 2cm; remission was defined as CDAI ≤ 2.8, SJC28 ≤ 1, TJC28 ≤ 1, PtGA ≤ 1cm, pain ≤ 1cm, fatigue ≤ 1cm, and MDGA ≤ 1cm. Between group (early vs. established) differences in time to first LDA/remission were assessed with Kaplan-Meier survival analysis and the log-rank test.

Results: A total of 986 patients were included, 347 (35%) with early RA and 639 (65%) with established RA. At baseline, patients with early RA were significantly younger (55.8 vs. 58.3 years) and were less likely to have a comorbidity (94.5% vs. 97.5%) or an erosion (26.7% vs. 62.6%), be RF-positive (65.6% vs. 74.2%), use bDMARDs (7.5% vs. 26.6%), and be non-smokers (38.9% vs. 47.3%). Time to achieving LDA based on CDAI (HR [95%CI]: (1.23 [1.07,1.43]), SJC28 (1.32 [1.15,1.51]), TJC28 (1.18 [1.02,1.36]), MDGA (1.28 [1.10,1.49]), PtGA (1.23 [1.05,1.44]), and pain (1.29 [1.09,1.52]) were significantly shorter in early RA compared to established RA. Similarly, time to achieving remission based on CDAI (HR [95%CI]: (1.50 [1.22,1.84]), SJC28 (1.35 [1.17,1.55]), MDGA (1.25 [1.06,1.47]), PtGA (1.22 [1.02,1.47]), and pain (1.37 [1.14,1.65]) were significantly shorter in early RA. However, no differences were observed in time to remission based on TJC28 (1.12 [0.96,1.31]) and either LDA or remission based on fatigue (LDA (1.10 [0.94,1.30]); remission (1.09 [0.92,1.31]). Adjustment for age, gender, presence of comorbidities, and baseline scores did not alter the results.

Conclusion: Time to achieving low disease state or remission based on various objective and patient-reported measures is significantly shorter in early compared to established RA with the exception of fatigue.

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Does Improvement in Patient Pain and Fatigue Lag Behind Clinical Remission in Rheumatoid Arthritis Patients? Data from a Rheumatoid Arthritis Registry

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Objectives: Rheumatoid arthritis (RA) patients are often not in remission due to patient global assessment of disease activity (PtGA) which is included in the formula of all disease activity indices. Given that PtGA may reflect pain or fatigue, the aim of this analysis was to assess the relative timing and perhaps lag of patient-reported outcomes (PRO) after remission is obtained as measured by clinical disease activity index (CDAI) or swollen joint count (SJC28) in a large observational database of RA patients followed in routine clinical care.

Methods: RA patients enrolled in the Ontario Best Practices Research Initiative (OBRI) registry that were not in low disease state at baseline based on the CDAI, SJC28, PtGA, pain and fatigue criteria below, and had at least six months of follow-up, were included in the analysis. Low disease state was defined as CDAI ≤ 10, SJC28 ≤ 2, PtGA ≤ 2cm, pain score ≤ 2cm, or fatigue score ≤ 2cm. Remission was defined as CDAI ≤ 2.8, SJC28 ≤ 1, PtGA ≤ 1cm, pain score ≤ 1cm, or fatigue score ≤ 1cm. Kaplan-Meier

survival analysis was used to assess the time to first low disease state / remission based on each definition.

Results: A total of 986 patients were included with a mean (SD) age and disease duration of 57.4 (12.9) years and 8.3 (9.9) years, respectively, and mostly women (80.0%). Mean (SD) of CDAI, SJC28, PtGA, pain, and fatigue at enrolment was 29.8 (11.7), 8.3 (4.6), 6.4 (1.9), 6.6 (1.9), and 6.7 (2.0), respectively. The median (95%CI) time in months to CDAI ≤ 10 was 12.4 (11.4-13.6), SJC28 ≤ 2 was 9 (8.2-10), PtGA ≤ 2cm was 18.9 (16.1-22), pain ≤ 2cm was 24.5 (19.4-30.5), and fatigue ≤ 2cm was 30.4 (24.8-31.7). For remission, the median (95%CI) time to CDAI ≤ 2.8 was 46.5 (42-54.1), SJC28 ≤ 1 was 12.5 (11.4-13.4), PtGA ≤ 1cm was 39.6 (34.6-44.8), pain ≤ 1cm was 54.7 (43.6-57.5), and fatigue ≤ 1cm was 42.6 (36.8-48).

Conclusion: Time to achieving low disease state or remission based on PROs is considerably longer compared to swollen joint count which may have significant impact on the time to CDAI low disease activity and remission. Remission and low disease activity composite scores, and PROs lag behind SJCs. Careful interpretation of PROs and composite scores could impact management including prevention of overtreatment and unnecessary switching of DMARDs.

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A Systemic Review of Factors Associated with SSc-PAH

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Objectives: Pulmonary arterial hypertension (PAH) in systemic sclerosis (SSc) is a lethal complication affecting approximately 8-15% of patients. Screening methods including echocardiography and pulmonary function tests exist to triage patients for definitive diagnosis by right heart catheterization. Improving our understanding of SSc-PAH associated risk factors could help stratify high-risk patients for regular screening.

Methods: A systematic review was performed in SCOPUS, Medline, EMBASE, Web of Science, and the Cochrane Library from their inception to February 22, 2019. Terms included phrases related to pulmonary arterial hypertension, systemic sclerosis, and prevalence. Studies were included if they reported on the frequency of a risk/association factor related to SSc-PAH. Studies were included if they determined PAH with right heart catherization, compared SSc patients with and without PAH, and had sample size larger than 20.

Results: The search found 2654 articles of which, 984 were duplicates and 1578 were excluded due to irrelevant title. After the remaining 92 were screened, 37 articles met eligibility criteria. Forty-three risk/association factors for SSc-PAH were identified and placed into seven categories. The most frequently mentioned categories included: patient characteristics, pulmonary physiology, antibody profiles, and genetics/epigenetics factors. In contrast, biomarkers and other labs featured the fewest distinct risk factors. Specific risk factors found for patients were lowered diffusing capacity of the lungs for carbon monoxide, older age, and longer disease duration among others. Interstitial lung disease and anti-centromere antibody (ACA) were also frequently associated (Figure 1).

Conclusion: Presence of ILD, ACA, older age, and disease duration are consistently identified risk factors in PAH-SSc. Risk factors for SSc-PAH such as limited-SSc, ACA, older age, longer disease duration and presence of ILD may enrich screening programs. Patterns in genotypes and antibody profiles are inconsistent and requires further validation. Understanding these risk factors may give insight into which patients will need further screening but some risks are associated with Class I PAH (ex. ACA) and others with Class III (ILD, hypoxia) which may be why risk factors are inconsistent in the literature.

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Prior Adherence to HMG Co-A Reductase Inhibitors is a Predictor of Subsequent Adherence and Persistence to Oral, but Not Parenteral, Osteoporosis Medications

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Objectives: At least 1 in 3 women and 1 in 5 men will suffer an osteoporotic fracture during their lifetime(1). Bisphosphonates are effective for treating osteoporosis (2). One US study suggested that adherence with other medications used to treat chronic asymptomatic conditions may be a strong predictor of bisphosphonate adherence (3). These findings have not been confirmed for parenteral osteoporosis therapies, nor in the setting of a public health care system such as Canada's, where the cost of medications is subsidized for patients over 65 years of age.

Methods: We included adults over the age of 20 who were new users of an oral bisphosphonate (alendronate and risedronate) and/or parenteral osteoporosis therapies (zoledronic acid, denosumab and teriparatide) from April 1, 2009-March 31, 2018 and had filled at least one statin prescription in the prior 12 months before the start date of the osteoporosis treatment. Adherence was defined as medication possession ratio ≥ 80%. Persistence was defined as continuous treatment without an interruption of treatment for more than 56 days. The data was extracted from several administrative databases in Alberta.

Results: Our study included 20612 new users of oral bisphosphonates (mean age 72.2 years) and 1538 new users of parenteral OP treatments (mean age 71.9 years). Adherence to statins was independently associated with both short term (1 year) and long term (5 year) adherence (OR (95% CI) was 1.34 (1.26, 1.42) at year 1) and persistence (OR (95% CI) was 1.28 (1.21, 1.36) at year 1) with oral bisphosphonate therapy but there was no association with adherence (OR (95% CI) was 0.94 (0.74, 1.20) at year 1) or persistence (OR (95% CI) was 0.96 (0.76, 1.22) at year 1) of parenteral therapies. Other factors associated with adherence and persistence with oral bisphosphonate therapy at year 1 included older age, history of bone mineral density scan and history of pap smear.

Conclusion: Prior adherence to HMG Co-A reductase inhibitors is a predictor of subsequent adherence and persistence with oral bisphosphonates but not parenteral therapies used to treat osteoporosis. References: 1. Osteoporosis Canada Fast Facts: https://osteoporosis.ca/about-the-disease/fast-facts/. 2. Wells GA, Cranney A, Peterson J et al. Alendronate for the primary and secondary prevention of osteoporotic fractures in postmenopausal women. Cochrane Database Syst Rev. 2008(1):CD001155. 3. Curtis JR, Xi J, Westfall AO et al. Improving the prediction of medication compliance: the example of bisphosphonates for osteoporosis. Med Care. 2009;47(3):334-41.

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Solid Tumour Outcomes in Patients with RA Treated with Abatacept and Other DMARDS: Results from a 10-Year International Observational Study

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Objectives: To assess the risk of solid tumour malignancies in patients with RA treated with abatacept vs conventional synthetic (cs)DMARDs and other biologic (b) or targeted synthetic (ts)DMARDs.

Methods: Data were analysed from four cohorts: two biologic registries (the Anti-Rheumatic Therapy in Sweden [ARTIS] register and the Rheumatoid Arthritis Observation of Biologic Therapy [RABBIT] German registry), a disease registry (FORWARD, The National Databank for Rheumatic Diseases in the USA) and a healthcare claims database (the population-based British Columbia Canadian RA Cohort [BC]). Exposure

defined as "ever exposed" unless specified. Crude incidence rates (per 1000 patient-years of exposure) with 95% CIs were calculated for overall malignancy, breast cancer, lung cancer and lymphoma. Adjusted risk ratios (RRs) with 95% CIs were estimated using multivariate models adjusting for demographics, comorbidities and other potential cofounders within each database and were subsequently pooled using a random-effects model for meta-analyses.1 1. DerSimonian R, Laird N. Control Clin Trials 1986;7:177–88.

Results: Patients treated with abatacept (~5100), csDMARDs (~74K) and other b/tsDMARDs (~37K) were followed up for a mean of 3.0–3.7, 3.0–6.2 and 3.0–4.7 years, respectively. Patients were mainly female (71–86%), with a mean age ranging from 55–63 years, and 4–34% had a history of malignancy. A greater number of abatacept-treated patients had been treated with ≥ 2 prior biologics (abatacept, 44–85%; csDMARDs, 11% [FORWARD] and other b/tsDMARDs, 0–19%). The incidence rate of overall malignancy in abatacept-treated patients was low (Table). Adjusted RRs (95% CIs) for abatacept vs csDMARDs (range: 0.8 [0.2, 3.4] to 1.3 [0.5, 3.3]; pooled estimate: 1.1 [0.8, 1.5]) and abatacept vs other b/tsDMARDs (range: 1.0 [0.4, 2.6] to 1.2 [0.6, 2.3]; pooled estimate: 1.0 [0.8, 1.3]) showed no increased risk in overall malignancy. Although individual registries showed a slight increase in breast (BC), lung (RABBIT) and lymphoma (ARTIS) cancers in patients treated with abatacept, numbers were too low to make an accurate comparative risk assessment.

Conclusion: While the development of malignancy is a potential risk associated with the use of immunomodulators, data from this large, international, post-marketing epidemiology study suggest that the risks of overall malignancy and breast, lung or lymphoma cancers were not significantly increased in patients treated with abatacept. These data are consistent with the established safety profile of abatacept. "Abstract previously presented at EULAR 2019, published in Annals of the Rheumatic Diseases 2019;78:190. DOI: 10.1136/annrheumdis-2019-eular.1663"

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Kawasaki Disease in Ontario Children From 1995-2017: A Population-based Descriptive Analysis

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Objectives: Kawasaki disease (KD) is a common pediatric vasculitis with rising global incidence. Associated coronary artery aneurysms (CAA) can result in significant long-term morbidity and mortality. However, our understanding of the trends in incidence, patient and disease characteristics for North American children over the past two decades remains limited, particularly in universal health care systems. This understanding can inform healthcare resource planning and identify knowledge gaps for educational initiatives. The objectives of this study were to: 1) compare patient, hospital and disease characteristics for children diagnosed with KD between two eras (1995-2001 and 2002-2017) and three age groups (0-4yr, 5-9yr, 10-18yr) and 2) determine trends in KD incidence across Ontario, Canada between 1995 to 2017.

Methods: We used healthcare administrative databases housed at the Institute for Clinical Evaluative Sciences (ICES) to identify a population-based cohort of Ontario children (0-18 years) diagnosed with KD during hospital admission between April 1995 and March 2017. We excluded children with previous KD diagnosis. We compared eras and age groups by Chi-squared test. We determined the annual incidence of KD in Ontario, compared by Cochrane-Armitage test.

Results: We identified 4346 Ontario children diagnosed with KD between 1995-2017. The mean (SD) age at diagnosis was 3.4 years (± 2.9) and male: female ratio was 1.5:1. Median (IQR) length of hospital admission was 3 days (2-4) and 104 children (2.4%) required PICU admission. No child died within 90 days of diagnosis. Baseline CAA were observed in 106 children (2.4%). There was no difference in baseline CAA by era (2.3%

[1995-2001] vs 2.5% [2002-2017], p = 0.72). CAA were significantly more common in children age 10-18 years (5.3% vs 2.4% [0-4yr] and 2.2% [5-9yr], p = 0.03). Myo-/pericarditis occurred in 71 children (1.6%). Red blood cell transfusions were administered to 51 children (1.2%) and were significantly more common during 2002-2017 (≤ 0.5% vs 1.5%, p < 0.001). The standardized incidence of KD increased significantly over the study period (p < 0.0001), from 6.5 cases per 100,000 person-years (1995-2000) to 8.4 cases (2012-2017). Significant seasonal variation was observed; incidence was highest from November to March (OR 1.7 – 2.1, using August as reference month) and peaked in January (OR 2.1).

Conclusion: The incidence of KD has increased significantly over the past 20 years in Ontario, Canada which may reflect increased awareness and improved diagnosis. However, the frequency of baseline CAA has not changed. Baseline CAA are more common in children 10-18 years. This may suggest delayed diagnosis in this age group.

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Trends in Mortality and Cause-specific Mortality among Patients with Psoriatic Disease in Ontario

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Objectives: To compare overall and cause-specific mortality rates among Ontarians with psoriasis, psoriatic arthritis (PsA) and general population comparators without psoriatic disease.

Methods: We performed a population-based study using health administrative data among adult Ontario residents between 1996 and 2016. Patients diagnosed with psoriasis (from 1996 onward) and PsA (from 2008 onward) were identified using validated case definitions and compared with individuals without psoriatic disease. All-cause and cause-specific age- and sex-standardized mortality rates, standardized mortality ratios (SMRs) and excess mortality rates were computed for the years 1996 to 2016.

Results: In 2016 we identified 176,858 Ontarians diagnosed with psoriasis and 15,430 diagnosed with PsA. A total of 2,524 psoriasis patients and 221 PsA patients died in 2016. All-cause mortality rates were greater among patients with psoriasis and PsA compared with the general population. The standardized mortality rate (per 1000 (95% Confidence Interval [CI]) in 2016 was 8.26 (7.92, 8.62) among those with psoriasis and 9.25 (7.97, 10.69) among those with PsA compared to 6.82 (6.78, 6.86) in the general population. Patients with psoriasis and PsA had excess mortality rates of 1.44 (95% CI 1.14, 1.76) and 2.43 (95% CI 1.19, 3.83), respectively. All-cause SMRs in 2016 were elevated for psoriasis: 1.18 (95% CI 1.13, 1.23); and PsA: 1.34 (95% CI 1.16, 1.52). Standardized mortality rates decreased by approximately 30% over the study period in both disease groups but remained elevated compared to the general population. The leading causes of death (%) and relative excess mortality (computed as SMRs) in psoriasis patients were cancer (28%) (SMR 1.11, 95% CI 1.03-1.20), diseases of the circulatory system (28%) (SMR 1.12, 95% CI 1.04-1.21), respiratory conditions (13%) (SMR 1.32, 95% CI 1.17-1.48), and mental/behavioural disorders (13%) (SMR 1.18, 95% CI 1.01-1.34). In those with PsA, circulatory disease (25%) (SMR 1.35, 95% CI 1.00-1.70) was the leading cause of death, followed by cancer (20%) (SMR 0.96, 95% CI 0.69-1.23), respiratory conditions (12%) (SMR 1.69, 95% CI 1.06-2.32), and mental/behavioural disorders (6%) (SMR 1.09, 95% CI 0.50-1.68).

Conclusion: Mortality rates in psoriasis, PsA and the general population have decreased over time, but remain significantly elevated in psoriasis and PsA compared to the general population. Leading causes of death among people with psoriasis and PsA were circulatory diseases, cancer, respiratory conditions and mental/behavioural disorders.

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Adherence to Statin Therapy in Rheumatoid Arthritis Patients: A Population-Based Cohort Study

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Objectives: Cardiovascular diseases (CVD) are increased in rheumatoid arthritis (RA) and lead to premature mortality. Statins are effective at preventing CVD, yet adherence can be problematic. The objective of this study was to assess adherence to statin therapy in a population-based cohort of RA patients compared to general population controls, and to identify the predictors of statin discontinuation in the RA cohort.

Methods: A population-based cohort study using administrative health data was conducted on all incident RA patients in British Columbia, and controls matched (2:1) on age, sex and calendar year. The study included all individuals who first initiated a statin between January 1997 and December 2009, with follow-up until December 2014. Statin discontinuation was defined as a gap in medication dispensing of ≥ 4 months. The primary outcome was time from statin initiation until first discontinuation, and the secondary outcome was adherence, measured as proportion of days covered (PDC) of medication, calculated only during active statin use. A multivariable Cox proportional hazards model was used to identify predictors of statin discontinuation in the RA sample only.

Results: The sample includes 4845 incident RA patients who were incident statin users, and 9204 controls, providing 39,241 and 75,959 PY of follow-up, respectively. 82.4% of RA patients and 80.2% of controls discontinued statins at least once, with a median (25;75 Pctl) number of discontinuations of 1 (1;2) for both groups. Time to first statin discontinuation was slightly lower for RA than controls. Median (25;75 Pctl) survival was 2.29 (0.38;6.47) years for RA and 2.64 (0.46;7.40) years for controls (p < 0.001). Incidence rate of discontinuation was 23.9 for RA and 21.5 per 100 PY for controls, yielding an incidence rate ratio (IRR) of 1.11; 95% CI, 1.07;1.16. Median (25;75 Pctl) duration of statin courses was 393 (100;1454) and 424 (100;1562) days for RA and controls respectively. Adherence [Mean (SD) PDC] during active treatment courses was 92.9 (9.3)% in RA patients and 92.7 (9.4)% among controls (p = 0.176). Significant predictors protecting against statin discontinuation in RA included having a higher number of daily medications; use of CVD medications; previous MI; and higher income. Depression was predictive of discontinuation.

Conclusion: Findings from our study indicate that RA patients and general population controls both frequently discontinue statin therapy but have high adherence during periods of statin use. Rates of statin discontinuation were slightly higher in RA patients, despite an increased risk of CVD. These results emphasize the importance of discussing adherence.

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Clinical Features Associated with Anti-dsDNA, Anti-Sm, and Hypocomplementemia within the Southern Alberta Registry for Lupus Erythematosus (STARLET)

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Objectives: In SLE, anti-dsDNA, anti-Sm, and hypocomplementemia have been associated with nephritis, anti-Sm with neurological disease, and hypocomplementemia with cytopenias and cutaneous vasculitis. In preparation for a machine learning study to identify lupus phenotypes, we assessed the clinical features associated with anti-dsDNA, anti-Sm, and hypocomplementemia within our STARLET cohort.

Methods: From 01/2014 to 06/2019, patients fulfilling the American College of Rheumatology (ACR) or Systemic Lupus International Collaborating Clinics (SLICC) Classification Criteria (CC) for SLE were enrolled. Demographic information, ACR/SLICC CC fulfilled, and the ACR/SLICC Damage Index (SDI) were collected annually. The clinical manifestations on the SLICC CC and SDI were compared (using chi-squared test) between those: 1) with and without anti-dsDNA, 2) with and without anti-Sm, and 3) with and without hypocomplementemia.

Results: Of the 252 patients included (91.0% female, mean age at diagnosis 36.0 years (standard deviation 15.7), mean disease duration 15.3 years (11.8), 60.1% white, 22.6% Asian), 64.7% had anti-dsDNA, 24.2% had anti-Sm, and 38.1% had hypocomplementemia at some point during the study period. Those with versus without anti-dsDNA were more likely to be male (with anti-ds DNA: 12.8% male versus without anti-ds DNA:1.3% male; p = 0.004) and have earlier disease onset (34.0 versus 39.8 years; p = 0.007), lupus nephritis (CC) (23.9% versus 11.2%; p = 0.015), serositis (CC) (35.6% versus 20.2%; p = 0.011), and hemolytic anemia (CC) (10.4% versus 3.4%; p = 0.048), but were less likely to have oral ulcers (CC) (40.5% versus 57.3%; p = 0.011) and valvular heart disease (SDI) (0.0% versus 2.6%; p = 0.043). Those with versus without anti-Sm were more likely to be male (with anti-Sm: 15.3% male versus without anti-Sm: 6.9% male ; p = 0.046) and have a maculopapular rash (CC) (18.0% versus 6.3%; p = 0.006) and chronic cutaneous lupus (CC) (19.7% versus 7.9%; p = 0.009). Those with versus without low complement were more likely to have earlier disease onset (32.8 versus 38.0 years; p = 0.013), have lupus nephritis (CC) (30.2% versus 12.8%: p = 0.0007), proteinuria (SDI) (8.9% vs 1.4%; p = 0.007), hemolytic anemia (CC) (14.6% versus 3.8%; p = 0.002), leukopenia (CC) (57.3% versus 34.6%; p = 0.0004), and thrombocytopenia (CC) (26.0% versus 13.5%; p = 0.012).

Conclusion: SLE patients with anti-dsDNA and hypocomplementemia were more likely to have renal and hematological manifestations, whereas those with anti-Sm were more likely to have cutaneous manifestations. Interestingly, patients with anti-dsDNA and anti-Sm were more likely to be male. Future analyses will utilize machine learning to identify lupus phenotypes by clustering patients based on demographic, clinical and immunological features.

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Hematologic and Non-hematologic Cancer Risk in a Large Inception SLE Cohort

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Objectives: To evaluate hematologic and non-hematologic cancer risk in a large international incident SLE cohort, and to assess potential risk factors including disease activity.

Methods: New-onset SLE patients from centres in North America, Europe, and Asia were annually assessed for disease activity, drugs, and new cancers. Multivariate proportional hazard regression was conducted, using baseline demographics (sex, race/ethnicity, and age at SLE diagnosis) and time-dependent variables for drugs (corticosteroids, anti-malarial, immunosuppressive), smoking, and adjusted mean SLE Disease Activity Index-2000 (SLEDAI-2K) scores, which were categorized into quartiles. In time-dependent analyses, we examined cancer risk for patients who had ever scored an adjusted mean SLEDAI-2K score in the highest quartile, versus those who had not.

Results: We followed 1668 SLE patients for a mean of 9-years, over which 65 cancers occurred (4.3 events per 1,000 patient-years). These included fifteen breast cancers, ten non-melanoma skin, seven lung, six hematological, six prostate, five melanoma, three cervical, three renal, two each gastric, head and neck, and thyroid, and one each rectal, sarcoma, thymoma, and uterine cancer. The hematologic cancers included three non-Hodgkin's lymphoma, one acute myeloid leukemia, one chronic myeloid leukemia, and one myeloma. All patients who developed hematologic cancers were Caucasians and smokers, and none were exposed to cyclophosphamide. In multivariate analyses, hematologic cancers were associated with higher disease activity (adjusted-HR 7.14, 95%-CI 1.13-45.3). In patients with non-hematologic cancer, univariate analyses suggested lower cancer risk (unadjusted-HR 0.49, 95% CI 0.27-0.88) but in adjusted analyses, though the point estimate was similar, the 95%-CI was wider and included the null value (adjusted-HR 0.64, 95%-CI 0.34-1.22). In both hematologic and non-hematologic cancer, older age at SLE diagnosis was associated with an increased risk (adjusted-HR 1.06, 95%-CI 1.00-1.13 and adjusted-HR 1.05, 95%-CI 1.03-1.06, respectively).

Conclusion: These analyses suggest that SLE patients with higher disease activity may have an increased risk of hematologic cancer. One hypothesis is that higher disease activity is associated with hematologic cancers due to chronic lymphocyte stimulation, but it is important to note that two of the hematologic cancers were of myeloid lineage. It has also been hypothesized that a very active immune system may be adept at deleting abnormal cancer precursor cells before they have a chance to become clinically significant. These hypotheses, though interesting, have yet to be confirmed. Our results are based on a small number of events, thus additional follow-up of the cohort is merited, in order to further understand what underlines hematologic cancer risk in SLE.

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Trends in the Incidence of Giant Cell Arteritis in Ontario, Canada

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Objectives: There is a paucity of data on the incidence of giant cell arteritis (GCA) in Canada. The majority of data on the geo-epidemiology of GCA have reported higher incidence rates from Scandinavian countries (ranging between 20.4 and 32.8 per 100,000 for the population older than 50 years) compared to other regions in the world. Our aim was to validate a case ascertainment definition of GCA using health administrative data and describe trends in the population-level incidence of GCA in Ontario, Canada.

Methods: We used a reference standard (131 GCA and 7,524 non-cases) from primary care electronic medical records, against which we computed and compared the sensitivity, specificity, and predictive values of administrative data case definitions. Validated case definitions were used to provide comparative estimates of incidence in the population. Among Ontario residents aged 50 years and older, we estimated the annual incidence rates between 2000 and 2018. A 10-year washout period was used to distinguish incident from prevalent cases.

Results: The accuracy of case definitions for GCA in Ontario health administrative data varies widely in terms of sensitivity and PPV but consistently have high specificity. The case definition with the optimal test characteristics defined GCA patients who had at least 1 hospitalization, or at least 2 diagnosis claims and at least 1 glucocorticoid prescription or at least 1 fee code for temporal artery biopsy in 3 years with at least 1 diagnosis claim by a rheumatologist, general internist, or ophthalmologist, and excluding those with fee codes for kidney, lung, skin, and nasal biopsies in the 1 year period of a diagnosis claim. The performance of this case definition had an 81% PPV, 60% sensitivity, 100% specificity, and 99% NPV. Upon applying this case definition to Ontario health administrative data, there was a relatively stable incidence over time with 25 new cases per 100,000 people over the age of 50. Comparing this case definition to others with modest sensitivity/PPV combinations provided incident rates between 24-33 cases per 100,000. Age-standardized incidence rates were significantly higher among females than males [31 cases (95%CI 29-34) vs. 15 cases (95% CI 13,18) per 100,000 in 2000]. Trends in age-standardized incidence rates were stable among females but increased among males over time. Incidence rates were highest among those aged 70 and older.

Conclusion: Overall, we identified stable age/sex standardized GCA incidence rates in Ontario over an 18-year period. The rising incidence among males over time warrants further research. Supported by a CIORA Grant.

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Prevalence of Giant Cell Arteritis in Ontario, Canada

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Objectives: Giant cell arteritis (GCA) most commonly affects older individuals of northern European descent. However, information on the prevalence of GCA is sparse. Our aim was to describe trends in the population-level prevalence of GCA in Ontario, Canada.

Methods: We performed a population-based study of Ontario health administrative data using validated case definitions for GCA. The base case definition defined GCA patients who had at least 1 hospitalization, or at least 2 diagnosis claims (and at least 1 glucocorticoid prescription or at least 1 fee code for a temporal artery biopsy) in 3 years with at least 1 diagnosis claim by a rheumatologist, general internist, or ophthalmologist, and excluded those with fee codes for kidney, lung, skin, and nasal biopsies (associated with other vasculitides) in the 1 year period of a diagnosis claim (81% PPV, 60% sensitivity, 100% specificity, 99% NPV). Among Ontario residents aged 50 years and older, we estimated the annual cumulative prevalence rates between 2000 and 2018. We performed sensitivity analyses using alternative validated case definitions to provide comparative prevalence estimates.

Results: Using our base case definition, the cumulative number of GCA patients increased from 4,306 patients in 2000 to 13,832 patients in 2018. Standardized rates increase from 125 (95%CI 121,129) to 235 (95%CI 231,239) cases per 100,000 people 50 years and older during the same

time period. The age-standardized rates among males rose from 76 (95%CI 72,81) cases in 2000 to 156 (95% 151,161) cases per 100,000 population in 2018. Between 2000 and 2018, the age-standardized rates among females similarly increased over time from 167 (95%CI 161,173) to 304 (95%CI 297, 310) cases per 100,000 population. Sex-standardized rates illustrated different patterns by age groups. During the study period, only modest increases in prevalence were observed among individuals 50-59 and 60-69 age groups, whereas prevalence among individuals 70-79 years increased in the early-2000s but stabilized from 2012 onwards. Prevalence rates were highest among individuals 80 and older, which also saw the most dramatic increase in rates over time. Sensitivity analyses using alternative case definitions to define GCA in the population also revealed rising prevalence rates in Ontario.

Conclusion: The overall prevalence of GCA in Ontario is similar to that reported in the UK, and considerably higher than that reported from southern Europe and non-European populations. Prevalence was significantly higher among females. The increased prevalence over time may be due to the increasing survival of the population. Supported by a CIORA Grant.

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Risk of Severe Infections and Mortality in Patients with Newly Diagnosis of Systemic Lupus Erythematosus. A Population-based Studies

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Objectives: Infections are serious complications in systemic lupus erythematosus (SLE) and often associated with premature mortality. Studies on the risk of infection in SLE patients suffer from small sample sizes. We conduct a population-based study to: 1) estimate the difference in the risk of hospitalization for infection in terms of the time to from diagnosis of SLE to onset of infection, the rate of infection recurrence and mortality rate due to infection in SLE and non-SLE cohorts; and 2) identified risk factors for severe infections among SLE patients.

Methods: Using administrative data and a previously validated SLE case definition, we assembled a cohort of all incident SLE patients between January 1st 1997 and March 31st 2015. The non-SLE cohort was random sample from the general population and 1:5 matched to the SLE patients on age, sex, history of pre-existing infection and index date. Our main outcomes were the first infection post SLE diagnosis, total recurrence of infections using discharge code in hospitalization data and infection mortality death registry data during follow-up. We used: 1) Kaplan-Meier estimates with log-rank test and multivariate Cox proportional hazard models to compare time to onset of infection and estimate hazard ratios; 2) the rate ratios for infection recurrence were computed with Poisson regression; and, 3) competing risk models were used to test the difference in infection-caused mortality rates in the SLE and non-SLE cohorts.

Results: We identified 5128 SLE patients with newly diagnosed SLE and 25640 non-SLE controls (86% females, mean age 50), yielding 946 and 2198 severe onset infections during 31,976 and 170,043 person-years. The crude incidence rate ratios were 2.29 (95% CI: 2.12-2.47) and 1.40 (95% CI: 1.26-1.53) (P < 0.001) and the adjusted hazard ratios were 1.18 (95% CI: 1.07-1.30) and 1.33 (95% CI: 1.15-1.59), respectively for incident infections and mortality. The rate ratio was 1.76 (95% CI; 1.49-1.93) and adjusted rate ratio 1.43 (95% CI; 1.28-1.60) for recurrent infections. Glucocorticoid therapy at baseline is a strong predictor for infection onset (HR = 1.41; 95% CI: 1.26-1.53) and recurrence (HR = 1.29; 95% CI; 1.13-1.37) in SLE patients.

Conclusion: In this population-based study, we found SLE was associated with increased risk of hospitalization for infection, infection recurrence and mortality when compared to the non-SLE controls. This highlights the higher severity of infection in patients with SLE. It is advisable to closely observe SLE patients with glucocorticoids therapy for infection prevention.

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Evaluating the Impact on Access of the Introduction of Nurse-supported Care for Persons With Complex Rheumatic Disease in British Columbia

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Objectives: A 2010 workforce survey by the BC Society of Rheumatologists revealed that British Columbia was facing a shortage of rheumatologists and consequent crisis of access to rheumatology care. Such care must be accessed in a timely manner to be most effective, both from the patient and payer perspective. In 2011, the BC Ministry of Health introduced a "Multidisciplinary Conference for community-based patients" billing code to facilitate nurse-supported consultations for "complex" rheumatology patients (G31060). The objective of this research is to evaluate the impact of introducing this new billing code and model of care on access to rheumatology care for the population of BC living with rheumatic disease.

Methods: The 2009-2016 study cohort was constructed using a validated algorithm for identifying rheumatic disease in BC administrative data, in conjunction with Population Data BC. Rheumatology services were identified using MSP billing data. Rheumatologists were classified by whether they provided nurse-supported rheumatology care (intervention) or status-quo rheumatology care (comparator). Access was defined by the counts per month of: 1) unique patients seen, and 2) rheumatology services billed. The impact was evaluated using interrupted time series analysis with a comparator. Sensitivity analyses explored the impact of more restrictive definitions of intervention, requiring more "consistent" (at least once in every year) and "high-intensity" (average ≥ 30 per month) billing of G31060.

Results: Primary analysis included 128,726 patients, 55% with non-inflammatory conditions, 22% rheumatoid arthritis, and 10% SLE/CTD, with other conditions each 5% or less. 46 rheumatologists were active throughout the study period, 29 'intervention' and 17 'comparator'. In the primary analysis, no statistically significant effect on change in level or trend of unique patients (p = 0.682 & p = 0.231 respectively) or service units (p = 0.744 & p = 0.419) attributable to the introduction of G31060 was detected. However, sensitivity analyses revealed significant increases in the number of unique patients per month when rheumatologists billed "consistently" and with "high intensity" (p = 0.030 & p = 0.031). By April 2015, these trend changes resulted in an additional 879 (62%) and 729 (168%) patients per month, respectively, as compared to a counterfactual without nurse-supported care.

Conclusion: The introduction of G31060 may not significantly impact the number of service units billed per month, nor does it necessarily increase the number of patients seen. However, consistent and high-intensity users of G31060 appear to increase the number of unique patients seen per month. This suggests nurse-supported models of care can improve patient access to rheumatology services at some threshold level of utilization.

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Validation of the Physical Examination for Knee Effusion Using Ultrasonography

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Objectives: To determine the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of common clinical tests for knee effusion, using ultrasound (US) as the gold standard.

Methods: Consecutive consenting patients with knee pain were recruited from an academic Rheumatology clinic. Clinical examination of the knees included inspection, warmth, bulge sign, cross-fluctuance, and patellar tap tests by an experienced rheumatologist. The knees were scanned by one sonographer who was blinded to the clinical exam findings. Based on published literature, a pathologic knee effusion was defined as a hypoechoic or anechoic collection measuring >3.2 mm in the lateral parapatellar recess.

Results: Patients (n = 69) had a mean age of 53 + 16 years and were predominantly female (75%). Most had rheumatoid arthritis (45%), other inflammatory arthritis (13%), or connective tissue disorders (13%); among these cases 25% also had osteoarthritis. Pain was reported in 80/138 knees (58%) and the mean pain score was 5.4+2.1 (10 point Likert scale). Patient self-reported swelling tended to overestimate the presence of effusion (specificity 41%, PPV 44%, accuracy 59%). In contrast, each physical exam test for effusion had high specificity (> 90%). If 1 or more tests were positive for effusion, the physical exam had moderate sensitivity at 74% (95% CI 57-87), specificity at 83% (95% CI 74-90), PPV 62% (95% CI 47-76) and NPV 89% (95% CI 81-95), with an overall accuracy of 80%. The cross-fluctance test tended to be more sensitive (66%) than inspection (42%) and the bulge test (32%) for detecting knee effusions. Patients with a false positive cross-fluctuance test had a higher BMI (28.2+3.3) compared to those with a false negative (24.6 +4.5, p = 0.05). Patients with false negative cross-fluctuance tests tended to have smaller effusions (6.9+3.4 mm) compared to those with true positive results (9.9+4.9 mm, P = 0.06). Among 6 knees with a positive patellar tap, all had positive cross-fluctuance tests but only 4/6 had a pathologic effusion on US; the 2 false positives occurred in a patient with an elevated BMI of 30.

Conclusion: The physical exam for knee effusion had only moderate sensitivity at 74% (95% CI 57-87) and specificity at 83% (95% CI 74-90), with an overall accuracy of 80% compared to US. Elevated BMI was associated with reduced accuracy of the physical exam. Ultrasound is a valuable tool that can be used as an extension of the physical exam to detect knee effusions.

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Rationalizing Temporal Artery Magnetic Resonance Angiography in the Diagnosis of Giant Cell Arteritis

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Objectives: (1) Compare temporal artery biopsy, ACR criteria, and temporal artery magnetic resonance angiography (TAMRA) in the diagnosis of giant cell arteritis (GCA). (2) Build a clinical model that predicts the clinical diagnosis of GCA. (3) Use the model to understand at what disease probabilities TAMRA is most useful to rule in and rule out GCA.

Methods: This analysis considered a retrospective cohort of 324 patients who had been previously referred to a rheumatologist for evaluation of possible GCA. The clinical information of 171 of these patients was made available from a previous clinical trial; the remaining 153 were consented for participation in a prospective GCA diagnostic database. A clinical diagnosis, regardless of agreement with American College of Rheumatology (ACR) criteria or biopsy, was used as the gold standard. Data concerning clinical features, inflammatory markers, imaging, and biopsy results were extracted for analysis. Best subset forward selection was used to create a multivariable logistic regression model to predict the diagnosis of GCA. Using this model, disease probabilities were calculated and the sensitivity, specificity, and predictive value of TAMRA in ruling in and ruling out GCA was determined.

Results: Those diagnosed with clinical GCA were older, more likely to have jaw claudication or vision loss, and had higher ESR and/or CRP than those without the diagnosis. An abnormal TAMRA was strongly associated with the diagnosis of GCA (OR 19.82, 95% CI 10.5-37.41). Multivariable logistic regression demonstrated that increasing age, the presence of headache, temporal artery tenderness, jaw claudication, vision loss, log(CRP), and the lack of symptoms of PMR were all predictive of the diagnosis of GCA with an area under the receiver-operator curve of 0.774, 95% CI 0.719 - 0.829 (table 2). The 1990 ACR criteria was 54.6% and 66.0% sensitive and specific for a diagnosis of GCA; TAMRA was 64.7% and 91.5%, and temporal artery biopsy were 38.9% and 100% sensitive and specific respectively. When a calculated probability of 75% or greater was considered a positive diagnosis, the model was 94.7% sensitive and 80.0% specific to rule in a diagnosis GCA; at 50% or less it was 92.3% sensitive and specific to rule out a diagnosis of GCA.

Conclusion: Multivariable logistic regression was able to fairly model the clinical diagnosis of GCA. Given that TAMRA demonstrated high sensitivity in those of low to medium pre-test probability of GCA, it can assist in ruling out the diagnosis of GCA and unnecessary further investigations.

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Sjögren the Strange: An Unusual Case of Pediatric Primary Sjögren's Syndrome Masquerading as Meningitis

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Background: Primary Sjögren's syndrome (PSS) is a multi-system disease that can present atypically with severe organ derangement. Clinical presentation of PSS in children is different than adults, with more extra-glandular features, including neurological involvement.

Case Presentation: A 10-year-old girl of Chinese ethnicity presented with 8 days of fever and new onset headache, dizziness, vomiting and neck pain. She was admitted for suspected meningitis. Initial investigations showed normal white blood cell and platelet count, with mild anemia (115 g/L [117-149]), elevated ESR (40 mm/hr [< 20]) and CRP (13 mg/L [< 10]). Cerebrospinal fluid (CSF) showed elevated nucleated cell count (26x106/L), predominantly lymphocytes. Blood and CSF cultures were negative. Routine inpatient audiology testing (given meningitis) showed bilateral moderate sensorineural hearing loss (SNHL). TB skin testing, chest x-ray, MRI and repeat CSF culture were all normal. The patient improved and was discharged with the presumed diagnosis of aseptic meningitis. She was readmitted one week later with recurrence of fever and meningitis symptoms. There was worsening anemia (98 g/L) with direct antiglobulin test (DAT) positive; autoantibody testing showed positive ANA 1:1280 speckled pattern with strongly positive anti-SSA and anti-SSB. Anti-dsDNA was negative and complement levels were normal. Serum immunoglobulin levels were elevated, predominantly IgG. She was diagnosed with primary Sjögren's syndrome and treated with IV methylprednisolone and hydroxychloroquine, followed by an oral prednisone taper. Symptoms completely resolved and follow-up audiogram prior to discharge showed improved hearing with mild residual loss. Serial follow-ups over two years showed return and maintenance of normal hearing and symptoms of mild dry mouth and multiple caries.

Conclusion: Our patient presented with acute aseptic meningitis and SNHL as heralding symptoms of primary Sjögren's syndrome (PSS). Aseptic meningitis is a rare but documented neurological manifestation of Sjögren's syndrome reported in adults and children. Hearing loss, mostly subclinical, has been reported in adults with Sjögren's syndrome. To our knowledge, this is the first reported case of a pediatric patient with PSS presenting with SNHL and aseptic meningitis.

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Clinical Outcomes of Juvenile Arthritis in Adulthood: A Systematic Review

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Objectives: Little is known about outcomes among JA adults. This systematic review aims to summarize clinical outcomes in adults with JA

(age >16), identify gaps of knowledge and recommend future research directions.

Methods: MEDLINE and EMBASE searches were developed and conducted by an academic librarian and the researchers. We focused on studies 2000-2017 for contemporary management outcomes. We excluded: non-English publications, studies evaluating the transition process, qualitative studies, obstetric outcomes, short reports/letters, case series. Mixed population studies (pediatric and adult patients) were included if the mean/median age at assessment was >16 years. The Quality in Prognosis Studies tool was used to assess risk-of-bias in 6 study domains: population, attrition, outcomes, prognostic factors, confounding, statistics. Each publication was assessed by 2 reviewers. Study data were extracted using a standard form.

Results: 63 papers were included, 35% studied mixed populations. Majority (50.8%) were cross-sectional. The 3 most common topics were disease activity/damage (35%), functional status (22%) and ocular complications (10%). Moderate-high risks of bias were present especially in study population (83%), attrition (82%) and confounding (95%). At a median/mean disease duration of 8-29 years, 21-60% of JA patients were in remission (14 studies). 9-15% of rheumatoid factor (RF) positive, 30-46% of RF negative polyarticular JA (PJA) (22.5 years, 2 studies), 18-44% of enthesitis-related arthritis/ juvenile ankylosing spondylitis (ERA/JAS) patients were in remission (23-27 years, 2 studies). Only 6-55% of those in remission were without medications (15-22 years, 3 studies). 22-96% (13-41 years, 7 studies) were on disease modifying anti-rheumatic drugs. 20-68% of patients were on biologics (8-13 years, 4 studies). 5-49% required at least one joint surgery. Median/mean HAQ ranged from 0-1.125 (9 studies); 18-51% had HAQ > 0 (4 studies). Prevalence of uveitis in oligoarticular JA was 16-47%, PJA 3-24% and ERAJAS was 24-28% (2-3 studies). Ocular complications were observed in 20-72% (7-12.4 years, 3 studies). Prognostic factors could not be pooled as outcomes studied were very heterogeneous.

Conclusion: Although there have been many studies published on outcomes in JA adults, they have moderate-high risks of bias in crucial study domains that limited interpretation of results. Prognostic factors were non-reproducible and could not be summarized. Attention to selection of study population, accounting for attrition and confounding, will improve quality of future studies. There should be a discussion among investigators to establish reporting of core outcomes in future adult JA studies to allow comparisons and facilitate future meta-analysis.

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Patient Satisfaction in a Rheumatology Transition Clinic: The Young Adults with Rheumatic Diseases Clinic in British Columbia

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Objectives: The challenges of youth with rheumatic disease in transitioning to adult health care setting may not be adequately met by "transition training programs" confined to the pediatric health setting (prior to age 18 yr.). We have had a bridging program for youth, the Young Adult Rheumatic Disease (YARD) Clinic, extending beyond school and pediatric care up to 24 years, or when the patient attains sufficient independent health management skills. We aimed to assess young adult perspectives on satisfaction with their care and information needs in the YARD clinic.

Methods: Youth attending the YARD clinic at the Mary Pack Arthritis Centre, Vancouver, BC, during October 2018-Feb 2019 were asked to complete a questionnaire developed by the YARD clinical team. The questionnaire asked respondents to rate their satisfaction with YARD clinical care and assessed their understanding of specific transition issues and skills. Subjects were asked to provide free text answers regarding what they liked or did not like about the YARD clinic. Questionnaire items were scored on a 5-point Likert agree to disagree scale. Strongly agree and agree categories were combined for analysis purposes. Free text answers were grouped by theme.

Results: 43 youth (76% F) completed the questionnaire. Mean age was 19 years (range 18-22). Youth diagnoses were juvenile idiopathic arthritis (25), systemic lupus erythematosus (10), vasculitis (2), dermatomyositis (1), other (5). The majority (95%) of participants reported satisfaction with the care received; 75% agreed that not having their parents attending their clinic visits encouraged them to take independent responsibility for their health care; 25% did not feel they received adequate information on substance use, and mental and sexual health services. In open questions, top positive aspects of the YARD clinic were friendly and welcoming staff, some staff continuity from pediatrics, and availability of a nurse to contact outside clinic. Youth reported several process issues as negative aspects of the clinic: confusion regarding emergency communication with health care providers outside clinic, travel to the centralized clinic site, and wait time in clinic. When asked 'the most difficult thing in dealing with your disease', emerging themes were the continued need for medications, chronic pain, and difficulty talking to others about their disease.

Conclusion: Youth with rheumatic disease attending a youth transition clinic after pediatric care report positive impacts on their health care management confidence and skills. The survey findings will inform further research and quality improvement in the YARD program.

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Depression and Anxiety Symptoms in Childhood-Onset Systemic Lupus Erythematosus

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Objectives: Depression and anxiety disorders are common in patients with childhood-onset systemic lupus erythematosus (cSLE). It is unclear if they are due to central nervous system involvement, chronic illness or treatment. We aimed to determine the prevalence and factors associated with clinically significant depression and anxiety symptoms in a cSLE cohort.

Methods: Patients > 8 years old who were seen in the cSLE clinic at The Hospital for Sick Children between July 2017 and September 2019, with cSLE per ACR/SLICC classification criteria, were recruited. Participants completed demographic questionnaires, Center for Epidemiologic Studies Childhood Depression Scale (CES-DC), Screen for Childhood Anxiety Related Disorders (SCARED), and Quality of My Life (QoML) scales. Medical history, SLE features, and medications were collected via chart review and clinic database. CES-DC score >15 and SCARED score > 25 indicated clinically significant depression or anxiety symptoms. Prevalence was compared to general North American population data from the National Comorbidity Survey Study– Adolescent Supplement1. Associations

between mood scores and SLEDAI-2K score, disease duration, and QoML scores, were analyzed with Spearman correlation.

Results: There were 52 recruited patients, 47 had questionnaires completed (mean age 15.2 years, SD 2.0), 91.5% females. Mean disease duration was 4.5 years (SD 2.7), and median SLEDAI-2K was 1.9, IQR (0,2.7). Mean CES-DC score was 13.0 (SD 9.8), patient-reported SCARED score 21.5 (SD 12.8), and parent-reported SCARED score was 13.4 (SD 8.1). Compared with NCS-A population data, cSLE patients had a higher prevalence of clinically significant depression (27.6% vs 11.2%, p = 0.0005), and anxiety (36.2% vs 8.3%, p < 0.0001), but only 8.5% of patients reported history of previous mood disorder or treatment. Higher CES-DC scores correlated with lower global QoML scores (r = -0.56, p < 0.001), and higher child (r = 0.46, p < 0.05) and parent-reported SCARED scores (r = 0.48 p < 0.01). Patient SCARED scores correlated with worse HRQoML (r = -0.31, p < 0.05). CES-DC and SCARED scores were not correlated with SLEDAI-2K, or disease duration. Clinically significant parent-reported anxiety was significantly less than patient-reported anxiety (7.7% vs 36.2% vs, p = 0.002).

Conclusion: High rates of clinically significant depression and anxiety symptoms were observed, but with low rates of prior depression or anxiety diagnosis and treatment in this cSLE population. Early direct patient screening for both depression and anxiety, and early interventions are important as this may impact quality of life in this patient population. 1Merikangas KR, et al. Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement. J Am Acad Child Adolesc Psychiatry.2010;49(10):980–989.

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Genetics of Avascular Necrosis in Children and Adults with Systemic Lupus Erythematosus

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Objectives: Genetics have been closely linked to SLE pathogenesis with over 90 SLE-risk loci identified through genome-wide association studies (GWAS). There is also evidence that genetics plays a role in risk of avascular necrosis (AVN), a significant and oftentimes debilitating complication of SLE. The purpose of this study was to examine the genetics of AVN risk in people with childhood-onset (cSLE) and adult-onset SLE (aSLE).

Methods: The study population consisted of 1247 patients with SLE (46% cSLE) from two tertiary care centres; one pediatric and one adult-care centre. All participants met ≥ 4 of the American College of Rheumatology and/or Systemic Lupus International Collaborating Clinics criteria for SLE, had prospectively collected clinical data and were genotyped on the Illumina MEGA or Omni1-Quad arrays. Un-genotyped SNPs were imputed and ancestry was inferred using principal components (PCs) (1000 Genomes Project reference). Our outcome was symptomatic AVN confirmed by imaging (radiograph, CT, bone scan and/or MRI). We completed GWAS of AVN using logistic regression with covariates for sex, age of SLE diagnosis, PCs, and maximum daily steroid exposure. Steroid exposure before age 18.5 was adjusted for body weight. We stratified analyses by array and meta-analyzed the results using inverse-variance weighting.

Results: The cohort included 1247 individuals with SLE, 46% of whom had cSLE. The mean age of SLE diagnosis was 24.6 years (SD = 13.6) and 87% were female. 158 patients (13%) had image-confirmed AVN. In patients with pediatric follow-up, maximum daily steroid exposure was significantly higher (p < 0.0001) in AVN cases (median = 1.42mg/kg; IQR = 15.6mg) compared to controls (median = 0.90mg/kg; IQR = 1.07mg/kg). In those with follow-up as adults, maximum daily steroid dose was significantly higher in AVN cases (p < 0.0001) (Cases: median = 40.0mg; IQR = 40.0mg vs. Controls: median = 20.0mg; IQR = 20.0mg). Meta-GWAS identified top intronic SNPs associated with AVN in CPNE4 (Chr3:rs75485985, OR = 2.34, p = 1.58x10-7) and SRD5A2 (Chr2:rs56128492, OR = 1.61, p = 2.78x10-7). These variants have not been previously cited to be associated with AVN-risk, nor are they in linkage disequilibrium with any previously cited AVN risk-SNPs. CPNE4 encodes a calcium-dependent, phospholipid-binding protein, and SRD5A2 encodes an enzyme in androgen processing.

Conclusion: Preliminary GWAS results have demonstrated variants with strong associations with AVN-risk (p < 5x10-7) in this multi-ethnic SLE cohort, however, no SNPs met genome-wide significance. Further analyses will involve conducting these multivariate GWAS analyses using time-to-event cox-proportional hazard models. We will then calculate additive genetic-risk scores (GRS) of previously cited AVN-risk SNPs and test these scores for association with AVN in this cohort. Best Abstract by a Medical Student Award

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Comparison of Office and Home Blood Pressure Measurements in Patients with Systemic Lupus Erythematosus

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Objectives: Clinic blood pressure (BP) measurements have been demonstrated to be misleading in healthy patients due to "white-coat" and "hidden" hypertension phenomena, inherent BP variability, as well as clinician bias. The aim of the present study was to investigate the agreement of BP measurements taken in the clinic and at home in patients with SLE.

Methods: SLE patients enrolled in the Lupus Clinic were recruited in a ratio of 2 hypertensive to 1 normotensive. BP was measured in the clinic by auscultation (1 reading) and again with an oscillometric device (3 readings). Hypertension was defined as ≥ 130/80 mmHg in either systolic or diastolic or both by auscultation. Participants then measured BP at home, in the morning and evening (3 readings each time), for 3 days using a loaned validated home BP monitoring device. Hypertension using oscillometric device and home device was defined as a mean 3 BP measurements of ≥ 130/80 mmHg in either the systolic or diastolic or both, in either the morning or afternoon or both. Demographic, clinical, laboratory and therapeutic variables including antihypertensives were also collected.

Results: The study included 13 female patients (mean age = 51.4 ± 17.2 years) with a mean duration of SLE of 16.2 ± 7.6 years. Mean BP by auscultation in the clinic was 129.8 ± 19.3/ 83.7 ± 11.5. In the office, we found that 9/13 by auscultation and 10/13 by the automated oscillometric device respectively were hypertensive. There was moderate agreement between these BP measurements (kappa = 0.42). At home 10/13 patients were hypertensive in the morning versus 8/15 were hypertensive in the evening. All 13 patients were hypertensive in either the morning or evening or both at home. There was only slight agreement between BP measurements taken by auscultation in the clinic and at home in the morning (kappa = 0.03) and evening (kappa = 0.16). There was concordance in 8 patients

and discordance in 5 patients when comparing hypertension by auscultation in the clinic to home readings: 4 patients had hidden hypertension, 1 had white coat hypertension, and 8 had sustained hypertension. No patients had sustained normotension.

Conclusion: Clinic BP measurements taken by auscultation are not able to accurately capture the variation in patients BP throughout the day. Home BP monitoring may be warranted for SLE patients in order to better diagnose hypertension and assess the effects of anti-hypertensive treatments.

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SLE Subgroups at Risk for Poor Outcomes After Hydroxychloroquine Taper or Discontinuation

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Objectives: The risks and benefits of longterm hydroxychloroquine (HCQ) use in systemic lupus erythematosus (SLE), versus tapering or stopping, remain uncertain. We aimed to identify predictors of a poor outcome once HCQ is tapered or discontinued in SLE.

Methods: We studied a clinical cohort of adult patients meeting ACR classification criteria for SLE. From January 2002 and December 2018, we identified the first visit with HCQ exposure for each patient. We then determined those tapering (sub-cohort 1) or discontinuing (sub-cohort 2) HCQ at a follow-up visit. This follow-up visit represented time zero for the remaining analyses. The primary outcome was time to the first of the following events: a) increase of > 4 points in the SLE Disease Activity Index (SLEDAI-2K); b) hospitalization for SLE; and/or c) augmented SLE therapy (i.e. an increase in HCQ, or a new start/increase in corticosteroids or immunosuppressants). Multivariate Cox regression was used to calculate hazard ratios and 95% confidence intervals to determine if baseline characteristics (age at SLE diagnosis, sex, education and race/ethnicity) were associated with our outcome.

Results: We identified 228 patients tapering HCQ (sub-cohort 1) and 188 stopping HCQ (sub-cohort 2). Most patients were female (90%) and white (70%), and the mean ± SD age at SLE diagnosis was 32 ± 13 years. The mean ± SD follow-up time from our time zero was 6.7 ± 4.4 years in sub-cohort 1 and 5.6 ± 4.7 in sub-cohort 2. Within the first year of observation, 167 (73%) patients who tapered HCQ and 133 (71%) patients who discontinued HCQ had at least one poor outcome. The most common poor outcome was therapy augmentation (70% after tapering and 64% after stopping HCQ), followed by SLEDAI-2K increase > 4 (37% after tapering and 32% after stopping HCQ) and hospitalization for SLE (7% after tapering and 8% after stopping HCQ). Patients with younger age at SLE diagnosis and those with SLEDAI-2K ≥ 4 and/or requiring prednisone/mycophenolate at baseline were almost twice more likely to experience poor outcomes after HCQ discontinuation. Patients with renal damage were twice more likely to have an increase in disease activity after tapering HCQ.

Conclusion: Though some SLE patients do well after tapering or discontinuing HCQ, others have poor outcomes including SLE-related hospitalization. Our results suggest caution in tapering or discontinuation of HCQ in some groups of SLE patients, such as those with renal damage, unstable disease activity, or requiring prednisone/mycophenolate. The identification of these predictors is an important approach to promote personalized medicine.

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Quality Care in SLE: Blood Pressure Treatment Patterns and Control

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Objectives: Hypertension (HTN) is a common co-morbidity in SLE and a key cardiovascular disease risk factor. As of 2018, Canadian Hypertension Guidelines recommend a target blood pressure (BP) of < 140/90 in general, but < 130/80 for certain at-risk populations. We described treatment patterns for HTN in SLE, evaluating uncontrolled HTN according to the two definitions, and determining if uncontrolled HTN was more common among potentially vulnerable groups (older patients, males, and non-Caucasians).

Methods: We conducted a cross-sectional assessment of the McGill Lupus Cohort patients, who receive standardized annual assessments recording BP (measured once sitting, with an automated cuff), medications, body mass index, and other clinical data. We identified all patients between January 2017-May 2019 taking medications for HTN at the time of their last annual visit. Patients taking HTN medications only for another indication (e.g. Raynaud's, proteinuria) were not included. Patterns of antihypertensive use were described. We determined the frequency of uncontrolled HTN according to the two definitions. Univariate and multivariate logistic regression evaluated if inadequate BP control was more common in older patients, non-Caucasians, and males (all of whom may be at risk for suboptimal health outcomes in SLE). The multivariate analyses also included disease duration.

Results: Of 442 SLE patients assessed during the study period, 108 were taking medications to treat HTN. Of these, 38 took multiple BP medications concurrently. Angiotensin receptor blockers were most commonly prescribed (N = 44), followed by calcium channel blockers (N = 40), diuretics (N = 33), angiotensin converting enzyme inhibitors (N = 40), and beta-blockers (N = 16). Among the 108 SLE patients treated for HTN, 43 (39.8%) had BP > 140/90 while 70 (64.8%) had BP > 130/80. In multivariate analyses of the 108 patients, Caucasian SLE patients were more likely to have uncontrolled HTN (odds ratio, OR 2.82, 95% CI 1.13-7.23). We were unable to draw definitive conclusions on the roles of male sex (OR 0.82, 95% CI 0.23-2.68), older age (OR 1.74, 95% CI 0.45-6.87), or SLE duration (OR 0.99 95% CI 0.94-1.05).

Conclusion: Over a third of SLE patients treated for HTN had BP <140/90 while almost two-thirds had BP >130/80. Limitations include the cross-sectional nature of our study and the single BP during clinic which make provoke 'white-coat syndrome'. We observed associations between Caucasian race/ethnicity and uncontrolled HTN. This may seem counter-intuitive, but further work (using a longitudinal repeated measure design) will explore whether HTN treatment, disease patterns or damage (i.e. renal failure) or concomitant medications (e.g. steroids, NSAIDs) may be driving these results.

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Anti-Synthetase Syndrome and Limited Scleroderma Overlap Syndrome; A Rare Association Presenting a Challenge in Management

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Background: Anti-synthetase syndrome (aSS) is a rare autoimmune disorder characterized by the presence of idiopathic inflammatory myositis and interstitial lung disease (ILD). Extrapulmonary manifestations can also include non-erosive polyarthritis, Raynaud's phenomenon, constitutional symptoms and/or mechanic's hands. Positive aminoacyl-transfer RNA (tRNA) synthetase autoantibodies, anti Jo-1 antibody in particular, is a hallmark in the diagnosis.

Case Presentation: A 62-year-old woman admitted to the medical ward with 1-year history of polyarticular joint pain that has progressively worsened over the past 1 month. Review of systems was significant for morning stiffness > 60 min, generalized muscle weakness, exertional dyspnea, non-productive cough, heartburn, fatigue, nocturnal fever and unintentional weight loss. She is a non-smoker and has no relevant medical, surgical, or family history. Her physical examination was significant for SpO2 of 93% while breathing ambient air, diminished air entry over the lung bases bilaterally, proximal muscle weakness in the upper and lower extremities, sclerodactyly, clubbing, mechanic's hand and bilateral symmetric joint

tenderness of the hands, wrists, elbows and knees; without any evidence of synovitis. CPK, transaminases, ESR and CRP were all elevated. Serological testing was positive for anti SSA, anti-Centromere, anti Jo-1, anti-nuclear antibody (ANA), and low-titer rheumatoid factor. Complements, anti-citrullinated antibody (CCP), anti-double stranded antibody (dsDNA), anti Scl-70 and anti- ribonucleoprotein (RNP) were all negative. CT chest revealed bibasilar ground glass opacities. The patient was diagnosed with anti-synthetase limited scleroderma overlap syndrome, presenting a challenge in management. In aSS, high doses of steroids (equivalent to prednisone 1mg/kg) is the mainstay of management. However, in scleroderma, corticosteroid doses higher than prednisone 15mg increase risk of scleroderma renal crisis. We initiated therapy with prednisone 15mg daily. Shortly after, the patient showed improvement in her muscle strength, respiratory status and oxygen requirements. She was discharged home on prednisone 10 mg orally daily and mycophenolate 500 mg orally twice per day to be increased gradually to 1500 mg orally twice per day.

Conclusion: The diagnosis of aSS should be considered in patients presenting with inflammatory myositis and ILD. The diagnosis can be confirmed using anti-synthetase antibodies, including anti Jo-1 antibody. The main stay of therapy is high doses of corticosteroids. Rarely, aSS can overlap with scleroderma, in that scenario steroids should be used with caution to avoid risk of scleroderma renal crisis. The addition of a second immunosuppressive agent is often warranted to hinder the progression of ILD and improve the overall prognosis.

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Prevalence of Subclinical Musculoskeletal Inflammation in Asymptomatic Patients with Psoriasis: A Systematic Review and Meta-Analysis

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Objectives: Thirty percent of patients with psoriasis develop an inflammatory arthritis known as psoriatic arthritis (PsA). Previous research has shown that disease activity of PsA correlates poorly with patient-reported symptoms and screening questionnaires. Patients who are recently diagnosed with PsA have increased healthcare costs and comorbidities in the 5 years prior to diagnosis, suggestive of a preclinical phase of the disease. This study aims to explore the prevalence of subclinical PsA defined by the presence of inflammatory arthritis (synovitis, enthesitis or spondylitis) in psoriatic patients who do not have any musculoskeletal complaints.

Methods: A search of the literature was conducted through PubMed, Embase, and Web of Science databases. Out of 280 potential articles, nine studies were selected based on a predefined selection criteria. Studies published in English until May 2019 that aimed to investigate the prevalence of subclinical inflammatory arthritis (synovitis, enthesitis and axial spondylitis) in patients with skin or nail psoriasis were considered. Studies included participants who were more than 18 years old, without musculoskeletal symptoms or use of any systemic immunosuppressants for at least two months were selected. Meta-analyses were conducted using random-effects modeling to evaluate the pooled prevalence and the relative risk of subclinical arthritis in asymptomatic psoriatic patients compared to controls. Heterogeneity was further explored with meta-regression and sensitivity analyses.

Results: Nine studies published from 2008 to 2019 were included, among which eight were case control studies, involving a total of 714 patients with psoriasis. In this population, the mean age was 42.3 ± 12.7 years, 59.8% were male, and mean disease duration was 9.3 ± 7 years. Six of the studies used musculoskleletal ultrasound (MSUS) as the investigating modality. MRI, CT/PET and bone scintigraphy were also used in one study each. The prevalence of subclinical PsA was 40% (95% confidence interval (CI) [0.28 - 0.52]). There was high heterogeneity in proportions (I square = 89%). Heterogeneity could not be explained by age, gender, or disease duration. Despite the absence of musculoskeletal symptoms, patients with psoriasis had an increased risk of subclinical inflammatory arthritis compared to non-psoriatic patients (RR = 2.26; 95% CI [1.30 - 3.93]; p < 0.01).

Conclusion: There appears to be a higher prevalence of subclinical inflammatory arthritis in asymptomatic patient with psoriasis. Future research is needed to fully elucidate the risk of transformation to symptomatic PsA and the benefits of early diagnosis and/or treatment of this pre-clinical phase of the disease.

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Differential Expression of Synovial Fluid microRNAs in Psoriatic Arthritis and Osteoarthritis

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Objectives: Psoriatic arthritis (PsA) is a chronic inflammatory arthritis that affects > 400,000 Canadians. Currently, there is no diagnostic marker available for PsA and its similarities to osteoarthritis (OA), the most common form of arthritis, make diagnosis challenging. Both diseases are associated with metabolic syndrome and are caused by biomechanical stress and microtrauma. MicroRNA transcripts (miRNAs) have recently been shown to play fundamental roles in modulating inflammation and cartilage degradation. miRNAs are small non-coding RNAs that regulate protein expression through degradation of complementary mRNAs. Synovial fluid (SF) that permeates joint cavities has been shown to be enriched with miRNAs. In this study we aimed to characterize miRNA populations in the SF samples collected from knees of OA and PsA patients using sequencing technologies, identify miRNAs differentially expressed between samples of the two diseases, and discover pathways potentially implicated in them.

Methods: We sequenced miRNAs (Illumina NextSeq 550) in SF samples from knees of twelve PsA (sex: 8M, 4F; age (years): (min, max, median) = (19, 64, 45) and twelve OA (sex: 6M, 6F, age: (min, max, median) = (43, 74, 60)) patients. Next, we used mirDIP (http://ophid.utoronto.ca/mirDIP/) and IID (http://iid.ophid.utoronto.ca/) databases to rank miRNA target-proteins that have physical protein-interactions in bone, synovial macrophages, chondrocytes, growth plate cartilage, synovial membrane, articular cartilage, and arthritis, based on the counts of targeting miRNAs differentially expressed between PsA and OA. Finally, we used pathDIP database (http://ophid.utoronto.ca/pathDIP/) to identify pathways enriched with these proteins.

Results: Out of 1800 detected miRNAs, fifty-one were significantly differentially expressed between PsA and OA (p < 0.05; two-tailed t-test, corrected by false-discovery-rate). Clustering of patients based on expression of these miRNAs showed clear distinction between PsA and OA samples. The three most differentially expressed miRNAs were miR-497-5p, miR-128-3p, and miR-27b-3p. QKI (RNA binding protein), OTUD4 (TLR signaling regulator), and NFAT5 (osmotic stress response regulator) in PsA, and CELF2 (mRNA processor), NFAT5, and ACVR2B (TGFβ receptor) in OA, were the highest ranked identified miRNA-targets. Enrichment analysis highlighted several pathways many of which are known to be related to PsA and/or OA supporting the identified miRNAs.

Conclusion: Analyzing miRNA expression in an integrative network-based approach has identified miRNAs, their protein targets, and related pathways which may be useful as diagnostic markers of PsA vs OA. Additional analysis, validation, and mechanistic studies of these findings will provide valuable insights into the systems-biology behind PsA and OA. Best Abstract on Spondyloarthritis Research Award

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Persistence of Biologics for the Treatment of Psoriatic Arthritis: Data From a Large Longitudinal Cohort

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Objectives: Data on persistence of biologic therapy in the literature has been conflicting. We aimed to review the current trend in biologic use among the psoriatic arthritis (PsA) patients cohort followed prospectively at a specialized over a period of 20 years.

Methods: All patients with PsA enrolled at cohort who initiated a biological therapy between January 1999 and March 2019 were included in this study. Time to and rate of discontinuation/switching were compared between different biologics groups. Outcome measures included persistence on index therapy, rates and reasons of discontinuing or switching index therapy in nonpersistent patients. Log Rank Test and Kaplan-Meier Survival Curves were used to compare different survival times for various biologics.

Results: 571 patients were included in the analysis. The most commonly prescribed biologic was Etanercept (58.5% of total patients) followed by adalimumab (43.1%). As first biologic, etanercept was the most commonly prescribed (48.7%). When used as first medication, golimumab had the highest 3-year survival rate among the various TNFi 0.71 (0.59, 0.86) followed by etanercept 0.7 (0.65, 0.76). The lowest retention rate and drug survival was observed for infliximab (3-year survival rate 0.52 (0.4, 0.67)). As the first medication, etanercept and Golimumab had significantly higher persistence rate compared to adalimumab (p < 0.01). The most common reason for discontinuation or switching of index therapy for all groups was loss of efficacy. Adalimumab was the most commonly prescribed second biologic (34.3%) and had significantly higher persistence rate compared to certolizumab (p = 0.006). As second medication, secukinumab had the highest 3-year persistence rate of 0.62 (0.42, 0.91). When used as second medication (switch from any previous biologic) secukinumab had a better 1, 2 and 3-year survival rates than when it was used as first biologic. At the medication start date, compared to patients with no switch, patients with at least one switch had significantly higher median PASI score (3.5 Vs 2.4, p < 0.001), tender joint count (2 Vs 1, p = 0.008) and enthesitis (25.76% Vs 17.95%, p = 0.025).

Conclusion: Different biologics have different pattern and order of prescriptions, resulting in various persistence rates. When used as second drug, TNFi had lower survival rates while secukinumab had higher values. It is important to note however that not all the drugs were available in 1999 therefore the number of options available may have influenced the choice of therapy and therefore drug persistence.

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Apremilast-induced Small-vessel Cutaneous Vasculitis in a Patient With Psoriatic Arthritis

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Background: Apremilast, an inhibitor of phosphodiesterase 4 (PDE-4), is approved in Canada for treatment of active psoriatic arthritis and moderate to severe plaque psoriasis. It is considered a relatively safe drug, with low infection rates. The most commonly described adverse reactions include diarrhea, nausea, headache, and upper respiratory tract infections.

Case Presentation: We report a case of suspected apremilast-induced cutaneous small vessel vasculitis in a patient with psoriasis and psoriatic arthritis who was treated with apremilast 30 mg bid after inadequate response to methotrexate. Bloodwork prior to treatment showed negative auto-antibodies including ANA. Approximately 9 months after initiation of apremilast, she developed new acrocyanosis with painful, ischemic ulcerations involving the distal fingers. Bloodwork showed strongly positive serology including ANA, dsDNA, anti-smith, anti-histone, anti-SSA and anti-RNP antibodies with low C3. MR angiogram showed diminished distal blood flow consistent with small vessel vasculitis. Aside from the

hands, she had no cutaneous vasculitis and no major organ involvement. She was treated with prednisone, hydroxychloroquine, and azathioprine in addition to withdrawal of apremilast. Symptoms completely resolved in 4-6 weeks. Complement and dsDNA normalized over 3 months. Given the temporal relation of apremilast initiation and development of cutaneous lesions and the rapid resolution after withdrawal of medication, we conclude that she had drug induced small vessel cutaneous vasculitis due to Apremilast.

Conclusion: A medical review by the FDA released that preclinical evaluation of apremilast in mice revealed arteritis of aorta, thymus, and lung. Vasculitis was also noted in 4-week oral toxicity study in cynomolgus monkeys. Because of these findings, evaluation for vasculitis was conducted in the clinical trials and no cases of vasculitis were reported during the development program for psoriasis indication. There were two cases of vasculitis in Phase 2 trials for rheumatoid arthritis indication; in a subject treated with apremilast 30 mg BID and a subject treated with placebo. To our knowledge, prior to ours, there have been no case reports of vasculitis with apremilast use from real-world experience. Early recognition of the Apremilast-induced vasculitis and discontinuation of the medication is important for resolution of skin ulcers and prevention of chronic changes. Further research and monitoring for this potential side-effect is required in the future. It is important to note cutaneous vessel vasculitis as potential side effect of Apremilast and have comprehensive approach to the work up of cutaneous vasculitis depending on the clinical context and underlying cause.

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Kumira Disease as a Cause of New Presentation of Raynaud's Disease

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Background: Kimura disease is a rare, chronic inflammatory disorder of unknown etiology characterized by development of subcutaneous lymphoid masses, regional lymphadenopathy, peripheral eosinophilia and elevated serum immunoglobulin E (IgE).

Case Presentation: We describe a case of a 62-year-old male of Asian descent with new painless subcutaneous mass and lymphadenopathy in the head and neck region, cutaneous involvement with small digital papules and nodules, and Raynaud's phenomenon. He was assessed for development of new Raynaud's which temporally coincided with development of head and neck lymphadenopathy and he did not have other clinical features of connective tissue disease. Laboratory tests showed elevated eosinophils at 2.0 x 10^9 /L. Right submandibular gland biopsy showed histologic features consistent with angiolymphoid hyperplasia with eosinophilia. This patient's Raynaud's was managed with conservative non-pharmacologic treatment and calcium channel blockers.

Conclusion: We describe a rare cause of new onset Raynaud's in patient with Kimura's disease. To our knowledge this is the second case of described Raynaud's phenomenon in a patient with Kimura's disease. Kimura's disease and angiolymphoid hyperplasia with eosinophilia can be cause of secondary Raynaud's in patients.

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The Association Between Mediterranean Diet and Disease Activity in Patients With Psoriatic Arthritis

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Objectives: Psoriatic arthritis (PsA) and psoriasis are chronic inflammatory diseases involving the skin and joints. Both diseases are associated with high rates of cardiovascular and metabolic comorbidities. The Mediterranean diet (Med-diet) is associated with improved cardiovascular and metabolic outcomes in the general population. Limited data suggest that the Med-diet may also be associated with a decline in psoriasis activity. However, no studies to date have investigated the effect of Med-diet on PsA. The study objectives were: 1) to describe adherence with the Med-diet among patients with PsA, and 2) to assess the association between adherence with the Med-diet and measures of disease activity in these patients.

Methods: 143 consecutive patients with PsA attending rheumatology clinics were recruited. Patients completed a self-administered questionnaire about their dietary habits over the past year. A validated Med-diet adherence score (MED-LITE) was calculated for each participant. Each patient was assessed by a rheumatologist, blinded to the dietary questionnaire, who performed a complete skin and joint exam. Tender and swollen joint counts, severity of psoriasis using body surface area and physician global disease activity were assessed. Additionally, patient reported outcomes assessing pain, physical function and fatigue were collected. Patients also completed bloodwork to measure levels of inflammatory, lipid and metabolic biomarkers. Differences in measures of disease activity were compared between patients with high (MEDI-LITE > 9) and low (≤ 9) Med-diet adherence scores using t-test for continuous variables and chi-square test for categorical variables.

Results: Of the 143 patients recruited, 68 reported high adherence to the Med-diet and 75 reported low adherence. Lower body mass index (BMI) was found in patients reporting high adherence with Med-diet (p = 0.03). However, there were no other associations between adherence to Med-diet and measures of PsA disease activity. There was also an association found between olive oil consumption and some of the patient-reported outcomes and disease biomarkers. Patients with high consumption of olive oil (score of 1 or 2) had lower BMI (p < 0.0001), lower fatigue scores (by FACIT) (p = 0.03), lower hsCRP (p = 0.045) and higher HDL (p = 0.004). There was also a trend for better patient reported outcomes with high olive oil consumption including the Bath Ankylosing Spondylitis Disease Index (BASDAI), Patient Global Assessment (PGA) and Health Assessment Questionnaire (HAQ).

Conclusion: There was no association between overall level of adherence with Med-diet and measures of PsA disease activity. However, there is a trend for an association between consumption of olive oil and measures of PsA disease activity.

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The Impact of Smoking on Prevalence of Psoriasis and Psoriatic Arthritis

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Objectives: In this systematic review and meta-analysis, we aimed to investigate the impact of cigarette smoking on the prevalence of psoriasis and psoriatic arthritis.

Methods: We performed a systematic literature review using the Medline, Embase and Cochrane Central Register databases. The literature was screened from June 2013 to July 2019 for psoriasis and from January 1980 to July 2019 for psoriatic arthritis. Our search was limited to English-language and keywords included 'Arthritis, psoriatic', 'psoriatic (arthritis or arthropathy) or seronegative arthritis', `psoriasis` AND `smoking or tobacco or nicotine'. Two reviewers (U.G.G, G.A.) independently performed the systematic review, and any disagreements were evaluated by the 3rd investigator (S.Z.A). The control group for psoriasis was subjects without psoriasis. For psoriatic arthritis two control groups were identified as a) psoriasis and b) general population. The initial literature search identified 884 psoriasis and 791 psoriatic arthritis articles. After reviewing all abstracts and full texts, 27 and 24 articles met the inclusion criteria for psoriasis and psoriatic arthritis, respectively. In addition 25 articles that were identified by a previous meta-analysis1 on psoriasis subjects, using the same methodology for the data between January 1980 to June 2013 were included.

Results: Within 52 psoriasis and 24 psoriatic arthritis studies, 24 and 13 articles respectively had given clear data on current vs ever vs ex smoking.

For the risk of psoriasis in the general population, there was an increased risk with ever smoking (OR: 1.80 95% CI 1.4-2.3), but not current-smoking (OR: 1.39 95% CI 0.74-2.63) or ex-smoking (OR: 0.98 95% CI 0.79-1.23). Ever-smoking (OR: 0.70 95% CI 0.60-0.81) and current-smoking (OR: 0.69 95% CI 0.56-0.85) decreased the risk of development of psoriatic arthritis within psoriasis whereas ex-smoking (OR: 0.82 95% CI 0.65-1.02) did not have any effects. Current, ever or ex smoking did not increase or decrease the risk of developing psoriatic arthritis in the general population (OR: 1.23 95% CI 0.89-1.69, OR: 1.10 95% CI 0.92-1.32, OR: 1.24 95% CI 0.73-2.10, respectively).

Conclusion: This meta-analysis showed that smoking increases the risk of psoriasis in the general population, whereas has a protective effect for development of psoriatic arthritis within psoriasis patients. The psoriatic arthritis risk was not affected by the smoking status within the general population; however, there were only 2-4 studies for this group which had clear information to be analyzed. 1. A.W. Armstrong et al. BJD Psoriasis and smoking: a systematic review and meta-analysis. 2014-170:304-14.

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The Risk and Trend of Venous Thromboembolism in Patients with Rheumatoid Arthritis: A General Population-Based Study

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Objectives: Previous studies assessing the risk of venous thromboembolism (VTE, including deep venous thrombosis (DVT) and pulmonary embolism (PE)) in rheumatoid arthritis (RA) show limitations, including the use of prevalent cohorts, use of selected samples, and lack of adjustment for medications. The objectives of this study were: 1) To assess the risk of VTE in a in patients with newly diagnosis of RA compared to the general population; 2) Estimate the trend of risk of VTE, PE, and DVT after RA diagnosis for up to 5 years.

Methods: Using physician billing data from Population Data BC (including all outpatient and inpatient visits from Jan 1990 to Mar 2015, and all dispensed medications from 1996 to Mar 2015), and previously validated algorithms, an RA cohort was established, and matched with a randomly selected non-RA cohort (1:2) with respect to age, sex, and index date. Incident VTE was defined using ICD codes (PE: ICD-9: 415.1, 673.2, 639.6; ICD-10: O88.2, I26, DVT: (ICD-9: 453; ICD-10: I82.4, I82.9), and prescription of anticoagulants. Incident rate ratios (IRRs) for PE, and DVT, and together (VTE) were calculated; as well as baseline adjusted hazard ratios (HRs) for risk of VTE, PE, and DVT comparing RA patients to the non-RA cohort. HRs were also estimated within 1, 2, 3, 4, and 5 years after index date. Two sensitivity analyses were performed: a simulated unmeasured confounder to estimate the effects of possible confounders, and a sub distribution model to account for risk of death.

Results: Among 63,129 cases with newly diagnosis of RA (66% female, mean age 59 years), the incident rates for VTE, PE, and DVT were 3.89, 1.48, and 2.88 cases per 1,000 person-years, respectively. The corresponding rates for the non-RA cohort were 2.40, 0.92, and 1.79 cases per 1,000 person-years, respectively. Compared with the non-RA cohort the HRs (95% CI) for VTE, PE, and DVT were 1.67(1.56-1.77), 1.64 (1.48-1.81), and 1.64(1.52-1.76). They remained statistically significant in the fully adjusted models (1.47(1.37-1.58), 1.43(1.28-1.60), and 1.44 (1.32-1.56), respectively. The highest risks for VTE were during the first year after the RA diagnosis [1.83(1.49-2.27)], with progressive decline after, but remaining statistically significant. PE and DVT showed similar trends.

Conclusion: Patients with incident RA have increased risk of VTE, PE,

and DVT (~43-47%). Furthermore, associated risks were at their highest after initial diagnosis, and decreased with time. These findings support the need of increased monitoring of VTE complications in patients diagnosed with RA.

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Major Stressors in the Year Prior to Diagnosis Affects RA Characteristics at Presentation and 1 Year

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Objectives: Although many RA patients attribute their disease onset to recent life events, results from retrospective studies remain unclear. We compared characteristics of newly diagnosed RA patients who did and did not report significant stressful life events (+STRESS) in year prior to diagnosis at baseline and 12 months.

Methods: Data were from early RA patients (symptoms < 1 year) enrolled in the Canadian Early Arthritis Cohort (CATCH) from 01-2007 to 03-2017 with ≥ 12 months of follow-up. Patients were asked about major psychological (death, divorce/separation, family, financial, other) and physical (motor vehicle accident, surgery, major illness/infection, other) stressors in previous year. We used independent t-tests and chi square to compare characteristics by sex and stress classification, and multivariable regression to examine the impact of +STRESS on disease activity and patient reported outcomes (PROs) at 1 year after adjusting for age, sex, education, and baseline fibromyalgia diagnosis and swollen joint count.

Results: The 1933 adults included in this analysis were mostly female (72%), with a mean (SD) age of 55 (15) years. At baseline, 52% reported one or more stressors in previous year; family (48%), financial stress (36%), death (35%), surgery (28%), and major illness (26%) were the most common stressors. Patients with +STRESS were more likely to be women, younger, have more comorbidities including fibromyalgia, and a slightly higher mean DAS28. Patients with +STRESS also had significantly higher mean pain, fatigue, depression, sleep disturbance, patient global, and HAQ scores at baseline.

Conclusion: In this pan-Canadian early RA cohort, stressful life events were common in the year prior to diagnosis and were associated with significantly worse depression, fatigue, sleep disturbance, pain, patient global and disability scores at diagnosis; 1 year later effects on PROs persisted even though disease activity was similar between groups. Newly diagnosed RA patients with a history of recent major stressors may benefit from emotional support to optimize how they feel and function.

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Global Rural and Remote Patients with Rheumatoid Arthritis: A Systematic Review of Disease Epidemiology, Clinical Outcomes and Health Service Utilization

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Objectives: Rural and remote patients with rheumatoid arthritis (RA) are at risk for inequities in health outcomes based on differences in physical environments and healthcare access potential. The aim of this systematic review was to synthesize epidemiology (incidence, prevalence, mortality), clinical outcomes (disease activity and severity indices, patient-reported outcomes) and health service use (primary care visits, specialty care visits, hospitalizations, surgeries, medication access) reported for global populations with RA residing in rural/remote locations. This evidence assists in identifying risk and resource factors to consider for care delivery and highlight knowledge gaps.

Methods: Medline, EMBASE, Healthstar, CINAHL and Cochrane were searched from inception to June 2019 using librarian-developed search terms for RA and rural/remote populations. Peer-reviewed published manuscripts employing cohort and cross-sectional study designs were included if they reported on any epidemiology, clinical or health service use outcomes specified in the study protocol.

Results: The search generated 1160 articles and 139 articles were selected for full text review. Full text review and data extraction was completed by 4 reviewers, and 54 articles were included for data synthesis representing studies from all continents with the exception of South America. The incidence rate of RA in global rural/remote populations ranged from 0.03-0.5 per 100 person years (n = 4 studies), and the prevalence from 0-1.8% (n = 32 studies). In studies where there was an appropriate urban population comparator, rural/remote populations were not at increased risk for RA (n = 11 studies), whereas 2 studies reported increased and 3 studies reported decreased prevalence. Rural/remote population clinical characteristics were reported in 15 studies, predominantly cross-sectional in design. In 6 studies that included an appropriate urban population comparator, there were no significant differences in disease activity measures between populations in 3 studies, with 2 studies indicating more severe disability and 1 study reporting worse physical function and health-related quality of life in rural/remote populations. Fifteen studies reported on health service use, with consistent findings that rural/remote patients had several barriers to care including longer time to RA diagnosis, decreased rheumatologist contact for follow-up, difficulties with accessing allied health professionals and investigations, and biologic therapy access. One study found rural/remote patients more frequently underwent orthopedic surgery, and 1 Canadian study found rural/remote patients had more frequent steroid exposure.

Conclusion: This synthesis highlights that RA epidemiology and clinical outcomes are not necessarily different between rural/remote and urban populations, however rural/remote patients face greater barriers to care which increases the risk for inequities in outcomes.

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Supporting Equity Through Rheumatoid Arthritis Treatment Guidelines: The Development of Logic Models for Six Populations at Risk for Inequitable Outcomes in Canada

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Objectives: The current Canadian Rheumatology Association Rheumatoid Arthritis (RA) treatment guidelines were developed for application in the general population. This approach does not consider treatment effect differences in specific populations, known population-group level differences in preferences for therapy, nor implementation considerations for population groups at risk for intervention-based inequity. Our objective was to develop logic models for population groups at risk for RA outcomes inequity in Canada that will be incorporated in the evidence-to-decision process of the RA Guidelines update.

Methods: We selected which population groups at risk for health inequities in RA treatment were important in the Canadian rheumatology landscape and would be prioritized based on a CRA operational committee membership survey, a review of existing chronic disease guidelines in Canada, and systematic literature reviews of randomized controlled trials for treatment

effects in different population groups and patient preferences. Qualitative methods, including semi-structured interviews, focus groups and discussion panels, with patients, stakeholders and care providers were used to identify barriers and facilitators to RA treatment and guideline implementation for the selected groups. These inputs were brought forward for logic model development by the research team.

Results: The six groups prioritized in the process include rural/remote, Indigenous, minority and refugee, sex/gender groups, low socioeconomic status (income), and frail senior populations. Interviews with 24 healthcare providers, 1 systems stakeholder, and 8 patients were completed. Using transcripts and field notes, logic models addressing patient factors (goals of treatment, patient beliefs and preferences, population manifestations impacting monitoring, efficacy differences, safety differences), initial and ongoing management (access, baseline testing, monitoring tests, reassessment of disease activity, loss to follow-up, coordination of care), and medication concerns (access, storage, strategy, adherence) were created for each group. Innovative models of care to reduce structural barriers to care, improved collaboration with primary care and other specialty care providers, stronger physician advocacy on behalf of patients, enhanced patient supports and a focus on communication and shared decision-making strategies are cross-cutting themes across population groups. Individual-population group approaches are recommended to address individual needs and realities, for example cultural competency training for physicians working with Indigenous populations, and trauma-informed care training for physicians working with refugee populations.

Conclusion: The process has identified challenges and solutions to address through specific health service interventions to ensure equity issues are incorporated in the upcoming RA Guidelines update.

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Health Assessment Questionnaire at One Year Predicts All-Cause Mortality in Patients with Early Rheumatoid Arthritis

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Objectives: Patients with RA are at greater risk of mortality than the general population. Higher HAQ disability has been associated with hospitalizations and mortality in established RA patients though whether HAQ disability predicts mortality early in to RA disease progression remains unknown.

Methods: Data were from adult early RA patients (symptoms < 1 year) enrolled in the Canadian Early Arthritis Cohort (CATCH) between 2007 and 2017; who initiated treatment with 1 or more DMARDs and had completed HAQ data at baseline and 1 year follow up. Descriptive statistics, t-tests and chi-square tests were used to summarize and compare baseline patient characteristics including sociodemographic variables, RA characteristics and comorbidities amongst deceased and non-deceased patients. Discrete-time proportional hazards models were used to estimate crude and multi-adjusted associations between HAQ at baseline and 1 year, respectively, with all-cause mortality in each year of follow up.

Results: This study included 1724 patients with early RA; mean age was 55 years and 72% were female. Over the 10-year follow up period, 62 deaths (2.4%) were recorded. Deceased patients had higher HAQ scores at baseline 1.2 (SD 0.7) and at 1 year 0.9 (SD 0.7) vs non-deceased 1.0 (SD 0.7) and 0.5 (SD 0.6) respectively, all p's < 0.001. Similarly, DAS28 scores were higher in deceased vs non-deceased at baseline with scores 5.4 (SD 1.3) vs 4.9 (SD 1.4) and at 1 year scores 3.6 (SD 1.4) vs. 2.8 (SD 1.4), p < 0.001. Age, female sex, lower education, smoking, more comorbidities, higher baseline disease activity and steroid use were associated with mortality in unadjusted survival models. Contrary to HAQ at baseline, the association between all-cause mortality and HAQ at 1 year remained significant even after adjusting for age, gender, comorbidities, disease activity, smoking, education, seropositivity, symptom duration and steroids in adjusted survival models - HAQ baseline unadjusted hazard OR 1.46 (CI 1.02-2.09) and adjusted 1.25 (CI 0.81-1.94) vs. HAQ at 1 year unadjusted hazard OR 2.58 (CI 1.78-3.72) and adjusted 1.75 (CI 1.10-2.77).

Conclusion: Higher HAQ at 1 year was significantly associated with all-cause mortality in a large Pan-Canadian early RA cohort. Present findings coupled with reported associations between higher DAS and HAQ in the literature suggest that poorer disease control in the first year of treatment for RA may lead to increased disability (high HAQ scores) which in turn may contribute to higher mortality.

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Efficacy and Safety of Filgotinib for Patients with Rheumatoid Arthritis Naïve to Methotrexate Therapy: FINCH 3 Primary Outcome Results

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Objectives: Filgotinib (FIL), an oral selective inhibitor of Janus kinase 1, has shown good efficacy and was well tolerated for the treatment of rheumatoid arthritis (RA). The objective of this study was to compare the efficacy and safety of FIL with and without methotrexate (MTX) in patients with RA who were naïve to MTX therapy.

Methods: This phase 3 study (NCT02886728) randomized patients with moderately to severely active RA (2:1:1:2) to FIL 200mg daily +MTX (up to 20mg weekly), FIL 100mg+MTX, FIL 200mg (+placebo [PBO]), or MTX (+PBO) for up to 52 weeks; results through Week 24 are presented. The primary efficacy endpoint was proportion of patients achieving ACR20 response at Week 24. Safety endpoints included types and rates of adverse events (AEs).

Results: Overall, 1,249 patients received study drug (FIL 200mg+MTX, n = 416; FIL 100mg+MTX, n = 207; FIL 200mg monotherapy, n = 210; MTX monotherapy, n = 416). Mean time since RA diagnosis was 2.2 years (median 0.4 years) and mean (standard deviation) DAS28-CRP was 5.7 (1.0). At Week 24, ACR20 response was achieved by 81.0%, 80.2%, 78.1%, and 71.4% of patients in the FIL 200mg+MTX, FIL 100mg+MTX, FIL 200mg monotherapy, and MTX monotherapy groups, respectively; p < 0.001 for FIL 200mg+MTX and p < 0.05 for FIL 100mg+MTX vs MTX monotherapy. Compared with MTX monotherapy, significantly more patients receiving FIL with or without MTX achieved ACR50 and ACR70 responses. DAS28-CRP scores ≤ 3.2 and <2.6 were achieved by 68.8% and 54.1%, 62.8% and 42.5%, 60.0% and 42.4%, and 46.2% and 29.1% of patients in the FIL 200mg+MTX, FIL 100mg+MTX, FIL 200mg monotherapy, and MTX monotherapy groups, respectively; p < 0.001 for all FIL groups vs MTX monotherapy (for both DAS28-CRP endpoints). Compared with MTX monotherapy, patients receiving FIL with or without MTX reported greater improvements in mTSS, HAQ-Disability Index, SF-36 PCS, and FACIT-Fatigue score. Serious AEs were observed in 4.1%, 2.4%,

4.8%, and 2.9% of patients in the FIL 200mg+MTX, FIL 100mg+MTX, FIL 200mg monotherapy, and MTX monotherapy groups, respectively. Onset of activity was rapid; significantly more patients achieved ACR50 and DAS28-CRP < 2.6 with FIL than MTX at Week 2. The FIL safety profile was consistent with prior studies through Week 24.

Conclusion: FIL+MTX led to significant improvements in RA signs and symptoms, physical function, and patient-reported outcomes compared with MTX alone and was well tolerated in patients with early, active, MTX-naïve RA. Clinically meaningful response occurred as early as 2 weeks after FIL initiation.

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Effects of Nintedanib in Patients With Systemic Sclerosis-associated ILD (SSc-ILD) and Differing FVC at Baseline: The SENSCIS Trial

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Objectives: In the SENSCIS trial in patients with SSc-ILD, nintedanib reduced the annual rate of decline in FVC (mL/year) vs placebo (primary endpoint). There was no significant difference between treatment groups in change from baseline in modified Rodnan skin score (mRSS) or St George's Respiratory Questionnaire (SGRQ) total score (key secondary endpoints) at week 52. We analyzed the efficacy of nintedanib in subgroups by FVC % predicted at baseline.

Methods: Subjects with SSc-ILD with ≥10% fibrosis of the lungs on HRCT and FVC ≥ 40% predicted were randomized to receive nintedanib 150 mg bid or placebo. We analysed the primary and key secondary endpoints in subgroups by baseline FVC <80% vs ≥ 80% predicted.

Results: 201 (69.8%) subjects in the nintedanib group and 196 (68.1%) in the placebo group had FVC < 80% predicted at baseline. The treatment effect of nintedanib vs placebo on rate of FVC decline was numerically more pronounced in patients with more preserved lung volume, compared to patients with FVC < 80% predicted but the treatment-by-time-by-subgroup interaction did not reach statistical significance. There were no meaningful effects of nintedanib vs placebo on change from baseline in mRSS and SGRQ total score in either subgroup.

Conclusion: In patients with SSc-ILD, nintedanib was observed to reduce ILD progression irrespective of FVC % predicted at baseline.

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Effect of Anti-Topoisomerase I Antibody Status on Decline in Lung Function in Patients with Systemic Sclerosis-Associated Interstitial Lung Disease: Data from the SENSCIS Trial

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Objectives: The presence of anti-topoisomerase I antibody (ATA) in patients with systemic sclerosis (SSc) has been associated with a greater risk of developing interstitial lung disease (ILD) and a greater rate of lung function decline in patients with early SSc. In the SENSCIS trial, nintedanib reduced the annual rate of decline in forced vital capacity (FVC) versus placebo in patients with SSc-ILD. We analyzed data from the SENSCIS trial in subgroups based on ATA status at baseline.

Methods: Patients with SSc according to the 2013 ACR/EULAR classification criteria, with ≥ 10% fibrosis of the lungs on a high-resolution computed tomography (HRCT) scan and with onset of the first non-Raynaud symptom < 7 years before screening were randomized to receive nintedanib 150 mg bid or placebo, stratified by the presence of ATA (based on historical information or, if not available, analysis at a central laboratory). We analyzed outcomes and adverse events over 52 weeks in subgroups of patients who were ATA positive or negative at baseline.

Results: Of 576 patients treated in the SENSCIS trial, 173 (60.1%) and 177 (61.5%) patients in the nintedanib and placebo groups, respectively, were ATA positive. In the subgroups that were ATA positive and negative, respectively, mean FVC % predicted was 71.4 (15.9) and 74.3 (17.7). Nintedanib reduced the rate of FVC decline compared with placebo both in patients who were ATA positive and negative. The treatment effect of nintedanib on reducing the rate of FVC decline was numerically greater in patients who were ATA negative than positive (-63.6 vs -35.9 ml/year), but the treatment-by-time-by-subgroup interaction did not indicate heterogeneous treatment effects between the subgroups (p = 0.49). In the nintedanib and placebo groups, respectively, absolute declines in FVC > 5% predicted were seen in 23.1% and 30.5% of patients who were ATA positive (OR 0.69 [95% CI 0.43, 1.10]) and 16.7% and 25.2% who were ATA negative (OR 0.59 [0.31, 1.14]) (treatment-by-subgroup interaction p = 0.73. The adverse event profile of nintedanib was consistent between patients who were ATA positive and negative.

Conclusion: In the SENSCIS trial in patients with SSc-ILD, the rate of FVC decline over 52 weeks in placebo-treated patients was similar between patients who were ATA positive and ATA negative. Nintedanib reduced the rate of FVC decline compared with placebo both in patients who were ATA positive and negative, with a numerically greater treatment effect in patients who were ATA negative.

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Efficacy and Safety of Nintedanib in Patients with Systemic Sclerosis-Associated Interstitial Lung Disease by Use of Mycophenolate at Baseline: Subgroup Analysis of the SENSCIS Trial

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Objectives: In the SENSCIS trial in patients with systemic sclerosis-associated interstitial lung disease (SSc-ILD), nintedanib reduced the annual rate of decline in forced vital capacity (FVC) vs placebo. Mycophenolate is commonly used in the treatment of SSc-ILD. We analyzed the efficacy and safety of nintedanib in the SENSCIS trial by use of mycophenolate at baseline.

Methods: Subjects with SSc-ILD with ≥10% fibrosis of the lungs on HRCT were randomized to receive nintedanib 150 mg bid or placebo. Patients who had received stable therapy with mycophenolate for ≥ 6 months prior to randomization were eligible to participate. We analyzed lung function outcomes and adverse events over 52 weeks in subgroups of patients who were and were not taking mycophenolate at baseline.

Results: In the nintedanib and placebo groups, respectively, 139 (48.3%) and 140 (48.6%) of patients were taking mycophenolate at baseline. In patients taking and not taking mycophenolate at baseline, respectively, FVC% predicted was 70.8 (16.0) and 74.2 (17.1). In patients who received placebo, the mean (SE) rate of decline in FVC over 52 weeks was -66.5 (19.3) mL/year in patients taking mycophenolate at baseline and -119.3 (19.0) mL/year in patients not taking mycophenolate at baseline. Nintedanib reduced the rate of FVC decline both in patients who were and were not taking mycophenolate at baseline. The treatment effect of nintedanib was numerically greater in patients who were not taking mycophenolate at baseline, but statistical testing did not indicate heterogeneity in the treatment effect between subgroups (p = 0.45).The adverse event profile of nintedanib was similar irrespective of mycophenolate use at baseline. The proportion of patients treated with nintedanib who had adverse events leading to discontinuation of trial drug was no higher in patients taking mycophenolate at baseline than in those who were not.

Conclusion: In the SENSCIS trial in patients with SSc-ILD, nintedanib reduced the rate of decline in FVC in patients who had not taken mycophenolate and in patients who had taken a stable dose of mycophenolate for ≥ 6 months prior to randomization. The treatment effect of nintedanib was numerically greater in patients who were not taking mycophenolate at baseline. Careful interpretation of the subgroups data by use of mycophenolate is warranted as patients were not randomized by use of mycophenolate and the patients using mycophenolate at baseline had tolerated it for ≥ 6 months prior to entering the trial. The adverse event profile of nintedanib was similar irrespective of mycophenolate use. Top 10 Poster

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Pulmonary Arterial Hypertension Screening Practices in Scleroderma Patients Amongst Canadian Rheumatologists

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Objectives: To determine Canadian rheumatologists' screening practices for pulmonary arterial hypertension (PAH) in patients with systemic sclerosis (SSc) and to identify reasons why screening guidelines may not be followed.

Methods: The Canadian Rheumatology Association (CRA) emailed a survey to all members (n = 596, 423 rheumatologists) in May 2019. Basic demographic information on location, years of practice and the percentage of SSc patients in their practice was collected. Participants were asked to self-identify as 'experts' or 'non-experts' and state how frequently they ordered cardiac and respiratory screening for PAH (echocardiogram, chest x-ray etc.). Subsequently, they were presented with the recommendations for annual screening and asked to choose options for why they were not adhering to guidelines, if applicable. The total number of respondents to each question was different which is reflected in the calculation of the proportions.

Results: Seventy-one (17%) rheumatologists completed all or part of the survey with representation from most Canadian provinces. Of 61 respondents, 70% (n = 43/61) classified themselves as non-experts. Overall, 81.4% ordered annual transthoracic echocardiography (TTE) (n = 48/59) and 77.6% (n = 45/58) ordered annual pulmonary function tests (PFTs). The rates of ordering annual TTE were virtually the same between experts and non-experts (81.3% and 82.5%, respectively), whereas experts appeared more likely to order annual PFT (87.5% vs. 75%). There was no geographic variation in screening rates although nearly half of respondents were from Ontario. The greater the percentage of SSc patients in one's practice, the more likely clinicians were to adhere to guidelines. Twenty-six (66.7%) rheumatologists with ≤ 5% scleroderma patients ordered both annual PFT and TTE versus 15 (83.3%) who had 6% or more scleroderma patients. There appeared to be an inverse relationship between years in practice and adherence to screening guidelines. Twenty-seven (79.4%) of those practicing for ≤ 10 years ordered both screening tests annually versus only 14

(63.6%) rheumatologists who practiced for greater than 10 years. The most common reason for not following annual screening guidelines was that the respondent did not agree with the current recommendations (n = 9/37, 24.3%), followed by the respondent being unfamiliar with the guidelines (n = 8/37, 21.6%).

Conclusion: PAH screening rates remain sub-optimal in Canada but have improved compared to 2012. Failure to adopt guidelines is mostly the result of rheumatologists disagreeing with or not knowing current recommendations. Future studies should examine strategies to improve guideline awareness and uptake.

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Development of a Patient-Centred Iloprost and Alprostadil Infusion Information Sheet for Patients with Scleroderma

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Objectives: Intravenous prostanoids such as iloprost have demonstrated effectiveness in healing digital ulcers and potentially preventing new digital ulcers in patients with systemic sclerosis (SSc). The most recent EULAR recommendations included iloprost as a treatment for severe Raynaud's Phenomenon and digital ulcers, particularly when oral therapies have failed. In Canada, available prostanoid infusions used include iloprost and alprostadil. An important issue raised by patients who have received these infusions has been the limited patient-directed information available to them. A quality improvement initiative was undertaken to address this care gap by developing a patient-centred information sheet about prostanoid infusions.

Methods: To assess the need for this information sheet and the contents it should include, a questionnaire was circulated to patients receiving prostanoid infusions between November 2017 and February 2019. Questions posed related to their level of knowledge and preparation for the infusion, where prior information had been obtained, and any further information about the infusion that they wished they had received. Of 17 respondents, 6 (35.3%) mentioned specific information about side effects, pain management, and what to expect after the infusion that they would have liked to have received. Based on this feedback, a preliminary draft of a patient information sheet was assessed and altered to address common patient questions about the infusion experience, including common and uncommon side effects to monitor for, symptoms that could be addressed by a nurse during the infusion with medication to treat pain or nausea, and what symptoms after the infusion should prompt a call to their doctor. This information sheet then underwent two Plan-Do-Study-Act (PDSA) cycles between February 2019 and September 2019. During this time, feedback was elicited from patients receiving prostanoid infusions. Significant revisions were incorporated into the next iteration. The information sheet was also reviewed by two rheumatologists with expertise in SSc and a pharmacist with expertise in rheumatological medications.

Results: Approximately one third of patients receiving prostanoid infusions reported lacking information even after their initial discussion with their health care provider. Specific concerns elicited from initial questionnaires were incorporated into a patient information sheet. The information sheet has undergone 2 PDSA cycles to date, with 3 patients participating per cycle, and after each cycle the sheet was revised based upon patient feedback and feedback from other reviewers, including a rheumatology pharmacist.

Conclusion: Patient input and feedback was instrumental in the development of a prostanoid infusion patient-centred information sheet.

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The Effect of Pregnancy on the Progression of Scleroderma

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Objectives: There are limited data available to guide clinicians and women with SSc in making informed decisions about pregnancy and their disease post-partum. While peripartum maternal and fetal complications have been reported, little is known about disease activity after pregnancy. We explored the trajectory of disease activity in women who experienced a pregnancy after SSc diagnosis and compared this with women who were nulliparous.

Methods: We conducted a retrospective cohort study of the Canadian Scleroderma Research Group (CSRG). We identified two groups of women: nulliparous (NP) and those who experienced ≥1 pregnancy after diagnosis (PAD) of SSc. Patients with underlying cardiac, lung or renal disease unrelated to SSc were excluded. Baseline characteristics of the two cohorts were compared using t-tests. Generalized estimating equations (GEEs) determined if the cohorts differed in the following SSc outcomes at 2 time points: force vital capacity, diffusing capacity of the lungs for carbon monoxide, right ventricular systolic pressure, glomerular filtration rate, physician global assessment of activity and physician global assessment of severity. Each analysis was controlled for age, time since SSc diagnosis, SSc subtype (limited vs. diffuse), and smoking status (pulmonary outcomes only).

Results: At their respective time of entry into the CSRG database, 153 women were nulliparous and 45 women had a pregnancy after their SSc diagnosis. The NP group was younger at SSc diagnosis (p < 0.001), had a shorter disease duration (p < 0.001) and a higher rate of inflammatory arthritis (p = 0.009). Six years after entry to the database, 48 remained in the NP group and 21 remained in the PAD group. At 9 years, 18 and 9 remained respectively. At baseline and at annual follow-up, pregnancy was not found to significantly affect markers of disease progression, including forced vital capacity (p = 0.898), (p = 0.620), RVSP (p = 0.313), eGFR (p = 0.426), patient global assessment of activity (p = 0.686) and physician global assessment of severity over time (p = 0.754).

Conclusion: This cohort study demonstrated that having ≥1 pregnancy after SSc diagnosis did not appear to significantly impact patient outcomes across measurements of renal, respiratory or global function over 9 years of follow-up. These results appear to suggest that pregnancy does not impact the course/severity of SSc, although the small sample size and biases inherent to retrospective data must be considered. This is a hopeful message for patients with scleroderma who are planning a pregnancy. Top 10 Poster

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Fatigue is Not Associated with 25-hydroxycalcitriol Blood Levels in Systemic Sclerosis

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Objectives: Systemic Sclerosis (SSc) is systemic autoimmune disease that can involve multiple organs. Moreover, fatigue is a common and unsolved problem in SSc patients, which can be linked to organ damage and other comorbidities. Vitamin D (VD) is considered to have an immunomodulator role in lupus, and high doses supplements have been reported to improve fatigue.

Methods: We did a cross-sectional study in a group of SSc patients at our institution in Canada and participating in a registry. The objectives were to assess the level of fatigue, scleroderma involvement, comorbidities, VD levels and treatment status.

Results: Data from 69 patients were analyzed. Fifty-six (82%) were women with a median age of 64 years, and all but 3 were Caucasian. Sixty-four (94.1%) met the 2013 ACR/EULAR classification criteria for SSc and the distribution by phenotypes was 69.6% limited cutaneous SSc, 26% diffuse, and 4% sine scleroderma. Fifteen percent had overlap syndromes. One third had sicca symptoms, 7% fibromyalgia and 19% depression. In terms of scleroderma-related ongoing organ involvement: 54% had gastro-esophageal reflux, 30% interstitial lung disease, 15% required esophageal dilatations, 9% had digital ulcers, 7% small bowel bacterial overgrowth and arthritis, 4% gastric antral vascular ectasias, 2% cardiac involvement and pulmonary arterial hypertension, and 1% scleroderma renal crisis. Median modified Rodnan skin score was 4, Medsger's severity scale 5, Charlson comorbidity index 4. The outcome measures median results were: physician scleroderma severity visual analogue scale (VAS 0-100) 14, scleroderma severity VAS according to patients 30, health assessment questionnaire HAQ-II (0-3) 0.7, fatigue VAS (0-10) 4.5, functional assessment of chronic illness therapy-4 (FACIT, 0-52) 31, pain VAS (0-10) 4 and PROMIS self-efficacy for managing symptoms short form (22.7-63.9) 48.9. The median 25-hydroxycalciferol serum value was 85 nmol/L (range 244, normal values 75-250). Twenty-four (35%) patients had 25-hydroxycalciferol ≤ 75nmol/L and 28 (41%) took a median of 1000mg of vitamin D per day. Patients on vitamin D were evenly distributed between patients with/without 25-hydroxycalciferol deficiency. The were no statistically significant differences in the outcome measure scales (including fatigue VAS and FACIT) analyzing the median values between patients with and without 25-hydroxycalciferol < 75nmol/L or patients with/without VD supplements.

Conclusion: In our study, patients with scleroderma had fatigue levels similar to other studies. Neither 25-hydroxycalciferol levels, nor treatment with low doses of VD showed differences in fatigue scores. A randomized clinical trial of high doses of VD versus usual supplementation might clarify its role in fatigue.

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Topical Tadalafil Cream for Treatment of Digital Ulcers in Systemic Sclerosis

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Objectives: Digital ulcers (DU) in systemic sclerosis (SSc) cause high morbidity and functional impairment. Treatment options are limited and often influenced by access to medications (both financial and geographical). Topical agents have not been extensively reviewed.

Methods: Using data from a single center SSc registry, we reviewed the use of tadalafil cream for new DUs in SSc patients from November 2018 to September 2019. Tadalafil 2% cream is compounded and dispensed per individual prescription in Ontario at a lower cost than oral phosphodiesterase-5 inhibitors. The drug was prescribed as 0.5 g of tadalafil 2% cream (equivalent to 10 mg of oral tadalafil) to be applied twice daily in the web spaces adjacent to the finger with the new DU for 4 weeks.

Results: Twelve patients, 69% women with a mean age of 55 years had DUs treated with tadalafil cream. Fifty-four percent had diffuse cutaneous

SSc, 47% limited and 8% sine scleroderma phenotypes. Three quarters had previous DUs. Upon the diagnosis of the new DU, all but 2 patients were on treatment for RP (median 1 drug). The patients were all treated with tadalafil cream added to current treatment (calcium channel blockers 67%, aspirin 31%, losartan and statins 15%, and prazosin and sildenafil 8%). The targeted ulcers were moderate according to the DU severity visual analogue scales (VAS, 0-100), and no digit with critical ischemia or large necrotic ulcer was treated with tadalafil cream (Table 1). There was a statistically significant improvement in the RP severity VAS assessed both by patients and physicians. DU severity VAS and general assessment (0-100) improved also in both groups, but only statistically significantly from the physicians' perspective. There was a reduced number of new DUs (p = 0.088). Topical tadalafil was well tolerated but one person stopped their background nifedipine due to nausea.

Conclusion: The addition of tadalafil cream added to the standard of care might be an effective treatment for new DU that are moderate to severe. Randomized clinical trials are needed to confirm the efficacy of tadalafil given topically for SSc DUs. Top 10 Poster

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Longitudinal Changes in Health-related Quality of Life in Systemic Sclerosis Treated With Autologous Hematopoietic Stem Cell Transplant Compared to Standard of Care

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Objectives: The objectives of this study were to quantify the magnitude, domains and duration of improvement in health-related quality of life (HRQoL) in systemic sclerosis (SSc) subjects treated with autologous hematopoietic stem cell transplantation (AHSCT) compared to standard of care in the setting of routine clinical care.

Methods: We compared SSc patients treated with AHSCT to SSc patients who fulfilled ASTIS eligibility criteria for AHSCT but who were treated with standard of care. Outcomes of interest were the Health Assessment Questionnaire (HAQ) and its disease-specific visual analogue scales (VAS), and the Short Form Health Survey-36 (SF-36). Differences in HAQ, VAS and SF-36 scores were compared using linear models, adjusting for baseline scores and inverse probability of treatment weights (iptw), calculated as 1/propensity score (ps) for the AHSCT subjects and 1/(1-ps) for the standard of care subjects. Propensity scores were estimated using logistic regression including the following covariates: female, age, disease duration, and other variables with a p-value < 0.10 in univariate comparisons. In addition, to account for the potential informative censoring between baseline and follow-up visits, the inverse probability of censoring weights (ipcw) was estimated by logistic regression, using the same covariates as in the propensity score model. The outcome model was a marginal linear model including only AHSCT, weighted by the product of the iptw and ipcw.

Results: We included 41 subjects who underwent AHSCT and 69 subjects treated with standard of care. Baseline HAQ scores were 1.4+0.7 in both groups. Baseline SF-36 PCS and MCS scores were 33.4 and 30.1, and 41.8 and 46.2, respectively, in the AHSCT and standard of care subjects. At baseline, the most severely affected VAS scale was that of general health. On a scale of 0-10, the mean was 4.9 in the AHSCT subjects and 5.1 in the standard of care subjects. In marginal linear weighted models, HAQ, VAS and SF-36 PCS scores were significantly better in subjects treated with AHSCT compared to standard of care, and the differences largely surpassed minimal clinically important differences. These differences also increased over time. However, there were no differences in SF-36 MCS scores in subjects treated with AHSCT compared to standard of care.

Conclusion: AHSCT was associated with marked improvement in physical HRQoL compared to standard of care, and the improvement was sustained and increased over time. This adds considerable complementary data to traditional biomedical outcome measures to support the role of AHSCT in severe SSc. Best Abstract by a Rheumatology Post-Graduate Research Trainee Award

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Cyclophosphamide for the Treatment of Skin Fibrosis in Systemic Sclerosis: A Systematic Review

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Objectives: Systemic sclerosis (SSc) is a chronic disease characterized by multi-organ involvement. Evidence for the pharmacologic management of skin involvement is limited and there is a need for further clinical guidance. The objective of this systematic review was to assess the efficacy of Cyclophosphamide in the treatment of skin fibrosis in patients with SSc.

Methods: Embase, MEDLINE and Cochrane Central Register of Controlled Trials were searched for all randomized control trials (RCTs), quasi-randomized studies, case-control studies, controlled before-after studies, prospective and retrospective cohort studies, case series and cross-sectional studies. The Health Canada registry, clinicaltrials.gov, the ISRCTN registry, and the World Health Organization (WHO) international clinical trials registry were searched for grey literature. Studies pertaining to patients with a diagnosis of SSc were included. The main intervention of interest was Cyclophosphamide with no limitation of regimens or route of administration. Comparators were other standard disease modifying agents or placebo. The outcome of interest was extent of skin fibrosis defined by the modified Rodnan skin score (mRSS). Two review authors completed independent and duplicate abstract and full text screening. Data extraction and quality appraisal were completed independently by two review authors. Meta-analysis was performed for the primary outcome (mRSS) through random-effects models.

Results: Thirty-one studies conducted between 1994 and 2018 were included: 11 RCTs, 13 case series, 4 retrospective cohort studies and 3 prospective cohort studies. The majority of the 11 RCTs showed some concerns in regards to risk of bias. After 12 months of treatment with Cyclophosphamide, mean mRSS decreased 6.30 points (95% CI, 4.95 to 7.64). The effect remained significant when pooling both 6- and 12-month outcomes – mRSS decreased 4.11 points (95% CI, 0.97, 7.25). Heterogeneity of comparators, use of steroids, and outcome endpoints did not allow for subgroup analyses to be completed as planned.

Conclusion: Statistically and clinically significant improvements in mRSS with administration of Cyclophosphamide were demonstrated in patients with SSc. The effect was greater at 12 months of follow-up. The lack of consistent standard of care for the treatment of skin fibrosis in SSc was highlighted by the variability in the type and duration of comparator treatments used in clinical trials. Although the use of Cyclophosphamide for skin fibrosis in SSc is justified by these results, there is a need for more consistent recommendations regarding treatment regimens, and longer clinical follow-up to better understand the role of immunosuppression as a treatment for this disease manifestation.

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The Use of Immunosuppression in Early Diffuse Cutaneous Systemic Sclerosis is Increasing Over Time

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Objectives: Immunosuppression (IS) remains the main treatment for significant skin involvement, active interstitial lung disease (ILD) and inflammatory arthritis or myositis in systemic sclerosis (SSc). This study investigated the pattern and trends in immunosuppressive use in patients with early SSc diagnosed before and after 2007.

Methods: Patients with early SSc from the Canadian Scleroderma Research Group (CSRG) database who had baseline and follow-up visits within 3 years of disease onset were included. Organ involvement was assessed by modified Rodnan skin score, Medsger Disease Severity Score (DSS) and CSRG definitions using bivariate, chi-squared, ANOVA, and adjusted regression analyses.

Results: There were 397 incident patients with SSc (183 dcSSc, 214 lcSSc); 82% females, age at diagnosis 53 ± 13 years, disease duration 1.6 ± 0.8 years, and 115 dcSSc patients (63%) and 62 lcSSc (29%) received IS, most commonly methotrexate (72% dcSSc and 52% lcSSc of total immunosuppression use), followed by mycophenolate mofetil and cyclophosphamide. IS was most frequently started at years 2 and 3 after the onset of first non-RP manifestation in dcSSc. The proportion of lcSSc patients receiving IS was significantly lower at each year and distributed more equally through the first three years. In dcSSc subset, IS was prescribed after 2007 more often (74% vs 50% prior to 2007, p = 0.001), especially methotrexate (p = 0.02) and mycophenolate mofetil (< 0.05), and earlier (highest frequency of IS prescriptions at 2 years after symptom onset compared to 3 years in dcSSc prior to 2007). In lcSSc 29% received IS ever prior to 2007 onset vs 30% after 2007 (p < 0.9). Within the patients receiving IS, monotherapy prevailed (77% dcSSc and 68% lcSSc); cyclophosphamide and azathioprine were the preferred choice of IS more frequently in lcSSc compared to dcSSc where methotrexate and mycophenolate mofetil were more commonly used. IS administration was associated with male gender, ILD, a-Scl-70 positivity, ACA-negativity and inflammatory arthritis in lcSSc, and with a higher mRSS, ILD and ACA-negativity in dcSSc. Multivariate regression showed that IS treatment could be predicted only by ACA-negativity in lcSSc (p = 0.012) and younger age in dcSSc (p = 0.002).

Conclusion: Over the past decade, more frequent and earlier IS in dcSSc is used, especially in younger patients. IS use has not increased in lcSSc over the time under study and is used in lcSSc for arthritis and ILD. Methotrexate and mycophenolate mofetil are now used more often, and less cyclophosphamide. Autoantibody status was the most consistent predictor whether a patient was likely have IS drugs.

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Pituitary Disease in Granulomatosis with Polyangiitis: An International Collaborative Case Series

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Objectives: Pituitary involvement is a rare clinical manifestation of Granulomatosis with Polyangiitis (GPA). The aim of this large collaborative retrospective case series of pituitary disease and GPA is to provide valuable data on the diagnosis and treatment of this rare presentation.

Methods: Patients with pituitary GPA were identified through the Canadian Vasculitis Research Network (CanVasc) and the Vasculitis Clinical Research Consortium (VCRC) database, and data was then retrospectively analyzed. We report a case series of 11 Canadian and 9 American patients.

Results: Of the 20 patients, 16 were female, with c-ANCA/PR3 positivity in 16/20. All patients had GPA involvement at other sites – 16 (80%) ENT, 13 (65%) pulmonary, and 6 (30%) renal. Diabetes insipidus was the most common presentation of pituitary dysfunction (14/20), followed by hypogonadism (6/20) and hypothyroidism (4/20). All patients received immunosuppression, 6 treated with rituximab, 8 with cyclophosphamide, and 6 with both. Of the patients with documented pre- and post-treatment MRI, 11/14 (78.6%) had significant improvement or resolution of pituitary disease.

Regardless of this, 12/20 (60%) patients had persistent symptoms of pituitary dysfunction.

Conclusion: Pituitary disease is diagnosed most often later than systemic GPA, is rarely isolated, and commonly seen in c-ANCA/PR3 positive patients in conjunction with other systemic manifestations. Diabetes insipidus, hypogonadism, and hypothyroidism were most common disease presentations. Immunosuppressive treatment, most often with corticosteroids in combination with cyclophosphamide or rituximab, improves radiologic findings on MRI, although pituitary dysfunction is often irreversible. Despite this, pituitary disease does not appear to negatively impact the global prognosis.

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A Gut Feeling – Segmental Arterial Mediolysis Mimicking Eosinophilic Granulomatosis with Polyangiitis

Larissa Petriw (Western University, London); Gina Rohekar (Western University, London)

Background: A 53-year-old man presented to hospital with sudden onset severe abdominal pain and nausea while eating. His past history was significant for biopsy-proven hypereosinophilic gastroenteritis, long-standing asthma on mepolizumab and omalizumab, and sinusitis. He is chronically prednisone-dependent with worsening diarrhea with tapering.

Case Presentation: CT showed periduodenal hematoma, pseudoaneurysm of the inferior pancreaticoduodenal branch of the SMA, eccentric aneurysms of the SMA, focal dissection of the celiac artery with thrombosis of the false lumen, and web-like stenosis of the hepatic artery. Renal arteries were irregular without beading. Rheumatology was consulted. Review of systems was negative for post-prandial abdominal pain, cardiac, respiratory, renal, skin, neurologic or MSK manifestations. His sinusitis was frequent but non-bloody and non-destructive. Prior to presentation, he had chronic low-grade abdominal pain and diarrhea. Examination was significant only for abdominal pain. Investigations showed normocytic anemia, eosinophils low at 0.1, and normal chemistries, liver panel and lipase. CRP was 34.6. Urinalysis was bland. ANCAs were negative. RF was 16, ANA positive at 1:80, ENA negative. The abdominal pain persisted despite bowel rest. After discussion with Allergy, a possible diagnosis of eGPA versus PAN was made. He was treated with methylprednisolone 1g IV x 3 days, Rituximab, and prednisone was tapered. Three months later, he had persistent abdominal pain and diarrhea while tapering prednisone. MMF was added but was not tolerated. Repeat CT six months after presentation showed persistent celiac artery dissection and pseudoaneurysms of the SMA, with segmental dissection in the mid and distal SMA. A diagnosis of SAM was made based on the imaging findings and lack of improvement on immunosuppression.

Conclusion: SAM is a rare non-inflammatory vasculopathy known to mimic medium-vessel vasculitis. The diagnostic gold standard is histology showing fibrin and collagen deposits, absence of inflammatory cells, and destruction of the media acutely with remodeling chronically. Imaging features and clinical presentation are also accepted as histology is rarely obtained. CTA shows lysis of the arterial medial layer, stenosis, occlusion and aneurysm formation, dilation and dissection, frequently with a segmental pattern. Imaging findings can be similar to other causes of medium-vessel vasculitis, including PAN or eGPA. However, unlike vasculitis, patients do not have other organ involvement and do not respond to immunosuppression. Vasculopathies such as SAM are important to remember when patients do not respond typically, or do not fit a classic pattern at the time of diagnosis.

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Development of a Referral Algorithm for the Fast-Track Giant Cell Arteritis Ultrasound Clinic in Montreal

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Objectives: Giant Cell Arteritis (GCA) is the most common primary systemic vasculitides. Confirming or excluding the diagnosis in a timely manner remains challenging. A delay in management can lead to permanent visual loss. Color Doppler Ultrasonography (CDUS) of the temporal, carotid and axillary arteries has proven to be highly sensitive and specific when performed by an experienced ultrasonographer using high resolution probes. Rapid diagnosis of GCA using CDUS in Norway resulted in a decrease of permanent visual loss from 18% to 2%. Although it assures a short consultation delay, an outpatient Fast-Track GCA Clinic might not be suitable for all patients. Some might present with impending emergencies requiring immediate assessment, such as irreversible ocular involvement, while others are at risk of treatment complications from empiric glucocorticoid therapy. This study aims to develop an outpatient referral algorithm for the Montreal Fast-Track GCA Ultrasound clinic.

Methods: A literature review was done to identify GCA symptoms that warrant immediate medical attention, as well as pre-existing medical conditions that can lead to complications from empirical glucocorticoid therapy when administered before assessment by a vasculitis expert. Six statements regarding the referral algorithm were submitted to GCA specialists and primary care physicians through a three round Delphi survey. Statements accepted or rejected by more than 80% of voters were not advanced to subsequent rounds. With the accepted statements, an outpatient referral algorithm for the Fast-Track GCA Ultrasound Clinic was elaborated. Every physician in the vasculitis clinic had to approve the proposed algorithm before its acceptance.

Results: Seventeen out of 30 physicians (56%) from 5 different centers in the province of Quebec answered the Delphi survey. Thirteen participants (76.5%) were specialists in vasculitides or often involved in the care of patients with GCA, including rheumatologists and internists. Four participants (23.5%) were general practitioners, including two emergency physicians. At the time of the survey, 52.9% of participants were following more than five patients with active GCA. Agreement level exceeding 80% was reached for every statement in the survey; thus, subsequent Delphi rounds were not required. The referral algorithm for the Fast-Track Ultrasound clinic was created and approved by all members of the vasculitis clinic.

Conclusion: An outpatient referral algorithm for rapid assessment of suspected GCA through a Fast-Track Ultrasound clinic was successfully created. Patients referred to our Fast-Track GCA clinic will be followed prospectively to evaluate the safety of the algorithm, performance and its impact on clinical outcomes.

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Color Doppler Ultrasound for the Diagnosis of Giant Cell Arteritis in Montreal: A Canadian Single Center Experience

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Objectives: Giant Cell Arteritis (GCA) remains challenging to diagnose as false negative temporal artery biopsy (TAB) can occur. Color doppler ultrasonography (CDUS) of the temporal, axillary and carotid arteries is useful when GCA is suspected. A wide range of sensitivities and specificities of CDUS are reported with better results when performed by a trained sonographer. The new GCA probability score (GCAPS) is intended to risk-stratify patients with suspected GCA into those with high probability versus low probability of GCA. This study aimed to compare CDUS results against TAB with final diagnosis of the specialist as the reference standard and to determine how GCAPS performs in relation to the final diagnosis.

Methods: A retrospective chart review was performed for all patients with suspected GCA who had a CDUS from July 2017 to May 2019 at Hôpital du Sacré-Coeur de Montréal. Patient characteristics, clinical presentation, physical examination, bloodwork, initial clinical suspicion of GCA and CDUS results was collected. TAB results and final diagnosis as determined by the treating physician were documented. GCAPS was retrospectively calculated if all the required items were available.

Results: A total of 56 patients had a CDUS examination; amongst them, 31 patients had a TAB. GCA was the final diagnosis in 20 patients, as determined by the treating specialist. Sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) were 95.0%, 100%, 100%, 97.3% for CDUS; and 81.3%, 100%, 100%, 83.3% for TAB, respectively. There were no false positive CDUS in patients without GCA. Only 1 patient with GCA had a negative CDUS while the TAB was positive. A false negative TAB was observed in 3 patients with GCA, all of which had a positive CDUS. False negative rate of CDUS was 5% as opposed to 18.7% for TAB. GCAPS score of < 9.5 points was found in 1 patient with GCA and 21 patients without GCA. At a cut point of 9.5 points, Se, Sp, PPV and NPV for the GCAPS were 95.0%, 65.6%, 69.3% and 95.5% respectively. In our cohort, GCA was the final diagnosis for all patients with a GCAPS ≥ 13 points.

Conclusion: CDUS of the temporal, carotid and axillary arteries showed a high sensitivity and specificity and helped to identify TAB negative patients with GCA. We validated that the GCAPS is a useful clinical tool in our patient population; a score < 9.5 points makes the diagnosis of GCA unlikely.

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A Curious Case of Cyanosis – Pembrolizumab-induced Digital Cyanosis and Subclinical Myositis

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Background: Pembrolizumab is an immune checkpoint inhibitor that is used to treat several advanced malignancies.

Case Presentation: We report, for the first time, a case of acral vasculitis and subclinical myositis in a patient with endometrial cancer treated with pembrolizumab. Immunomodulation with high-dose glucocorticoids, followed by a prolonged taper, as well as mycophenolate mofetil, in combination with vasodilation with a calcium channel blocker, pentoxifylline, and topical nitroglycerin paste, and anti-platelet therapy with low-dose aspirin led to a favourable outcome, without the development of necrosis, gangrene or acro-osteolysis.

Conclusion: Our case highlights the possibility of immune-related adverse events affecting different organ systems simultaneously. Increased awareness and suspicion of additional organ involvement is recommended. Given the potential outcome of digital necrosis and amputation, early intervention for digital ischemia is warranted, using a multi-pronged approach. Further research is needed on the underlying mechanisms and relative efficacy of various treatments for immune checkpoint inhibitor-related adverse events, including vasculitis and myositis.

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A Case of Arthritis, Enthesitis, and Erythema Nodosum in a Young Woman With Acute Mastitis

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Background: We describe a very rare etiology of polyarthritis, erythema nodosum, and/or enthesitis.

Case Presentation: A 26-year old woman presented to the emergency room (ER) with acute Achilles enthesitis and polyarthritis of 1 week's duration limiting ambulation. She was otherwise healthy, however weeks prior to this visit she developed acute mastitis of the outer left breast; she was given 10 days of cephalexin with partial response, and ultrasound exam ruled out a mass or abscess. On our initial assessment in the ER she had effusions in both knees and wrists, bilateral Achilles enthesitis, lower extremity erythema nodosum, and bloodwork demonstrating elevated C-reactive protein of 23 mg/L and erythrocyte sedimentation rate of 56 mm/hr. She was discharged on prednisone 25 mg with a slow taper and seen in follow-up 2 weeks later, at which time there was moderate improvement in her musculoskeletal symptoms but worsening of her mastitis. Investigations revealed anti-nuclear antibody 1:80, negative rheumatoid factor, anti-cyclic citrullinated peptide, extractable nuclear antigens, double-stranded DNA, and anti-neutrophil cytosolic antibody. CT chest ruled out masses and hilar lymphadenopathy. A subsequent repeat breast ultrasound demonstrated tubular hypoechoic areas without abscess. Core needle biopsy was performed, revealing neutrophilic and granulomatous inflammation consistent with granulomatous mastitis (GM), with negative stains for microorganisms including mycobacteria. At second follow-up 3 weeks later, on 10 mg of prednisone, her musculoskeletal symptoms resolved but the mastitis persisted and ongoing care was transferred to a specialized breast disease clinic.

Conclusion: GM is a rare cause of non-lactational mastitis that occasionally presents in a syndrome with arthritis and erythema nodosum[1]; this is the first reported case of an association with entheseal involvement. This case describes a very rare etiology of polyarthritis, erythema nodosum, and/or enthesitis, and expands our awareness about different presentations of the granulomatous diseases. References: 1. Sheybani F, et al. Treatment for and clinical characteristics of granulomatous mastitis. Obstet Gynecol. 2015 Apr;125(4)801-7.

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Expectations and Educational Needs of Rheumatologists and Rheumatology Fellows in the Field of Precision Medicine in Canada

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Objectives: Precision medicine, as a personalized medicine based on biomarkers, is a booming field. Some genetic tests are already prescribed by rheumatologists and many more are expected to gradually appear in clinical settings to better guide treatment choices. Physicians have a positive attitude towards integration of precision medicine into clinical practice, but their knowledge and experience are limited. In this study, we assessed the expectations and educational needs in the field of precision medicine among rheumatologists and rheumatology fellows in Canada.

Methods: We conducted an anonymous online survey between June 2018 and January 2019 for rheumatologists and rheumatology fellows among the members of the Canadian Rheumatology Association, assessing precision medicine expectations and educational needs as well as the preferred format for training in this field. Descriptive statistics were presented for all quantitative variables (mean and standard deviation) and qualitative variables (frequencies and percentages).

Results: Forty-five rheumatologists and 6 fellows answered the survey, 34 of them completing the whole survey. 51% of respondents were male,

35.6% had been practicing rheumatology for more than 20 years, mostly in University Hospitals (64%) and patient care was their principal activity (86%). A total of 78% of rheumatologists and fellows would like to receive additional training on precision medicine in rheumatology. They were mostly interested in clinical utility of precision medicine tests, their validity and accuracy, the interpretation of test results and strategies for integrating them into their practice. In the remaining 22% of participants, who were not interested in pursuing precision medicine education, the main reasons were lack of evidence-based guidelines supporting the use of precision medicine tests in rheumatology, lack of availability of those tests, the widespread availability of written information on the subject and the fact that they were already comfortable with the use of those tests. Most of the participants agreed that precision medicine tests are relevant to current medical practice and susceptible to change clinical approaches with benefits such has helping determine prognosis, diagnosis and avoiding treatment toxicity. They were, however, less convinced that precision medicine tests are useful to help choose the most effective treatment and improve patients' adherence.

Conclusion: Our study showed that rheumatologists and rheumatology fellows in Canada are overall interested in getting additional precision medicine education. Indeed, while convinced of the potential benefits of precision medicine tests, most physicians don't feel confident in their ability and judge their training insufficient to incorporate them into clinical practice.

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Rheumatologist Survey on Medical Cannabis: Results from the Ontario Best Practices Research Initiative: (OBRI)

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Objectives: To assess rheumatologists knowledge and comfort level with medical cannabis.

Methods: All investigators currently participating in the Ontario Best Practices Research Initiative (OBRI) (n = 66, 28 males, 38 females), a registry of rheumatoid arthritis patients followed in routine care in Ontario, were invited to complete a medical cannabis survey. The survey was developed by the OBRI, in collaboration with their Clinical and Patient Advisory Committees, and included questions regarding the prevalence of medical cannabis use, the level of prescriber comfort and knowledge, as well as concerns for authorizing treatment.

Results: A total of 29 (44%) rheumatologists completed the survey between January 15 and May 3, 2019. Most of the rheumatologists who completed the survey were female (66%), between the ages of 41-59 years (41%) and were evenly distributed between community and academic practices. When asked which health care professional(s) / clinic(s) should be responsible for authorizing medical cannabis use, the majority chose cannabis clinics (83%) and/or primary care physicians (62%). Most rheumatologists indicated they were not comfortable or somewhat uncomfortable authorizing the use of medical cannabis (66%), and the majority reported that they would refer their patients to a medical cannabis clinic if they requested medical cannabis (76%). Most rheumatologists identified osteoarthritis as the most common diagnosis in patients using medical cannabis (41%), followed by rheumatoid arthritis (31%), chronic pain (28%), and fibromyalgia (24%). The greatest concerns / barriers with regards to them authorizing medical cannabis were lack of product standardization or prescription related information (69%) and/or lack of knowledge (62%). Many rheumatologists were also concerned about the potential for misuse / abuse, (49%) and liability (44%). Only 14% of the rheumatologists believed they were

knowledgeable about medical cannabis as a treatment option, while 52% felt they had little or no knowledge or minimal knowledge. The majority indicated that the medical literature was their source for information on medical cannabis (76%), followed by experiences with patients (48%) and other physicians (41%).

Conclusion: Most rheumatologists are assessing the use of medical cannabis by their patients and believe cannabis clinics and primary care physicians should be responsible for authorizing the use of medical cannabis. The results of this survey indicate that rheumatologists would like more research-based information and more standardization of the products.

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Risk Factors Associated with Serious Infections among Users of Biosimilar and Originator Infliximab Therapies

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Objectives: To assesses risk factors associated with serious infections in new users of originator infliximab or infliximab biosimilar.

Methods: We used MarketScan administrative health data to create a cohort of adult new users of infliximab (originator infliximab or infliximab biosimilar), between Jan.-Dec. 2017. The first infusion was the cohort entry date. A 90-day current exposure period was assigned for every infusion and individuals could contribute person-time through the observation period. We assessed frequency and time to first serious infection, defined as those associated with hospitalization. Crude incidence rates were generated to compare infection risk between originator infliximab and infliximab biosimilar. Cox proportional hazards regression models were adjusted to identify risk factors associated with serious infections: current infliximab therapy (originator or biosimilar), age, sex, prior biologic use, prior and current use of DMARDs and systemic glucocorticoids, past hospitalized infection, age-adjusted Charlson comorbidity index (CCI), and underlying conditions (rheumatoid arthritis, ankylosing spondylitis, psoriasis/psoriatic arthritis, Crohn's disease, ulcerative colitis).

Results: We studied 2676 individuals, including 2584 originator infliximab and 92 infliximab biosimilar. Most (60%) were women and the mean age was 44 ± 15 years. We identified 115 hospitalized infections during follow-up. Infection rates were 5.5 (95% CI 1.4-22.1) for current infliximab biosimilar and 8.5 (95% CI 7.0-10.3) for originator infliximab. We were unable to identify an association between infliximab therapy and hospitalized infection (adjusted hazard ratio, HR: 0.75, 95% CI 0.18-3.1). Age-adjusted CCI, past hospitalized infection, and prior and current use of glucocorticoids were associated with risk of hospitalized infection.

Conclusion: We were unable to detect differences in serious infectious between originator infliximab and infliximab biosimilar. High comorbidity score, occurrence of past infections and use of glucocorticoids were associated with increased risk of hospitalized infections. Additional long-term studies would be of additional help in establishing safety profiles.

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Intereron-α Therapy Causing Immune-Mediated Skin Lesions Mimicking Dermatomyositis: A Case Report and Review of Literature

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Background: Interferon-α therapy is used in various medical conditions. Its immunomodulatory effects may provoke immune-mediated adverse effects, eczematous and lichenoid reactions being most common. We report a case of IFN-α induced skin lesions mimicking dermatomyositis (DM).

Case Presentation: A 63-year-old patient known for essential thrombocytosis (ET) treated with interferon alpha-2b (IFN-a2b) consulted in advanced medical dermatology with violaceous papules and plaques on the dorsal surface of the hands, PIPs, DIPs, elbows, knees and toes. The skin lesions were clinically suspicious for DM, although skin biopsy was non-specific (mild perivascular lymphocytic infiltrate with atrophic epidermis). Creatinine kinase levels were normal and auto-antibody work-up was negative, including anti-nuclear antibodies, extractable nuclear antibodies, myositis panel and anti-double stranded DNA. A 14-day course of daily prednisone 20mg did not improve the skin lesions. Over the following 8 weeks, the plaques quickly evolved into an erosive, painful and crusting exanthema that progressed proximally. An IFN-α induced immune-mediated reaction mimicking dermatomyositis was suspected. Although the ET was stable for two years with IFN-a2b therapy, the decision was made to suspend IFN-a2b and begin daily prednisone (1mg/kg) with a rapid tapering schedule over 3-4 weeks. Within 48 hours, no new active skin lesions appeared and in the following 14 days, previous skin erosions completely healed and residual erythema was minimal.

Conclusion: Only 4 cases of DM attributed to IFN-α therapy are reported. In each case, autoantibodies were detected: anti-PL-7 Ab and ANA, Anti-Jo-1 and ANA. Different mechanisms have been proposed to explain auto-antibody formation in IFN-induced autoimmunity. Enhanced activity of antigen-presenting dendritic cells by maturation of those cells is one. B-cell differentiation and production of inflammatory cytokines (IL-6, TNF) are observed as well. Sustained intracellular production of IFN-inducible immune molecules is also thought to cause direct cell toxicity. The important role of IFN in the pathogenesis of DM is highlighted by the upregulation of 25 genes when comparing DM biopsies with other inflammatory myopathy biopsies, 21 of them being inducible by IFNα-β. This is often called the "IFN signature". As opposed to our patient, the few previously reported patients with IFN-induced DM had serological evidence to support diagnosis; the treatment consisted of IFN therapy discontinuation, glucocorticoids, IV-immunoglobulins, tacrolimus or methotrexate. Early recognition of IFN-α immune-mediated manifestations, with prompt discontinuation of therapy may prevent the occurrence of severe adverse effects.

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Guidelines on Prescribing and Monitoring Antimalarials in Rheumatic Diseases: A Systematic Review

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Objectives: The purpose of this systematic review was to identify existing guidelines for antimalarial prescribing and monitoring in rheumatic diseases, specifically for hydroxychloroquine, and how these guidelines compare between organizations and have evolved over time.

Methods: A literature search was conducted using Embase and Medline to identify guidelines published from 1946 to September 2018. MeSH terms were employed for the search strategy with alternative spelling and related words entered as keywords and separated by 'OR' to broaden results. The Embase and Medline strategies both contained the same sub-searches for antimalarials and retinal disease, however they differed in the use of MeSH terms pertaining to guidelines. In addition to reviewing all English search results, references of all articles were reviewed to retrieve additional guidelines.

Results: A total of 243 results were reviewed, after accounting for

duplicates, to obtain 11 recommendations. The American Academy of Ophthalmology, Royal College of Ophthalmologists and Canadian editorials summarize ophthalmology recommendations. Rheumatology sources include American College of Rheumatology and Canadian Rheumatology Association statements. American and British guidelines changed from suggesting hydroxychloroquine doses ≤ 6.5 mg/kg/day to ≤ 5 mg/kg/day more recently. American guidelines recommended baseline visual field testing and annual screening after five years. Visual field testing evolved from using Amsler grids to current recommendations of 10-2 automated visual fields and spectral-domain optical coherence tomography (SD-OCT). The 2012 Canadian recommendations suggested initial field testing every two years, with SD-OCT after 10 years. Older British guidelines advocated for baseline and annual assessment with Amsler grids during rheumatology clinic visits. The 2018 British guidelines support baseline and annual screening after five years with 10-2 visual fields, SD-OCT and fundus autofluorescence.

Conclusion: The newest recommendations suggest a hydroxychloroquine dose of ≤ 5 mg/kg/day. Retinal toxicity is irreversible; and the risk increases over time on antimalarial therapy. Annual screening after five years of treatment with automated visual fields and SD-OCT seems to be warranted to detect early changes and discontinue therapy if necessary. It is uncertain whether the magnitude of retinal toxicity is increasing due to early detection with more sensitive tests or if newer recommendations are based on best evidence.

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Extrapulmonary Sarcoidosis with Bone Marrow Involvement: A Case Series and Literature Review

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Objectives: Sarcoidosis is an inflammatory noncaseating granulomatous disease. Pulmonary involvement is present in more than 90% of patients, and extrapulmonary sarcoidosis is less common with isolated extrapulmonary disease being rarer still. Of patients with extrapulmonary sarcoidosis, bone marrow involvement is not frequently described. We report a case series of 3 patients who have a diagnosis of extrapulmonary sarcoidosis with bone marrow involvement.

Methods: We retrospectively reviewed the charts of 3 patients identified at a single centre in Vancouver. Data was extracted with regards to clinical presentation, investigations, and treatment. A literature review was conducted with search terms "sarcoidosis" and "bone marrow" using MEDLINE, EMBASE, and PubMed from inception until October 2019.

Results: Of the 3 patients, patient #1 and # 2 were female and patient #3 was male. Their age ranged from 17 to 49 years and follow-up period was 4 to 18 months. All had biopsy-confirmed noncaseating granuloma in bone marrow as well as hepatic and splenic involvement. None had significant pulmonary sarcoid. Malignancy, mycobacterial and fungal infection were excluded. Patients #1 and #2 presented with cytopenias, splenomegaly, transaminitis, intraabdominal lymphadenopathy, and constitutional symptoms. Both had high ACE level. Patient #1 also had acute renal injury with granulomatous interstitial nephritis on renal biopsy. She responded to high dose prednisone monotherapy with taper. Patient #2 also suffered from profound thrombocytopenia secondary to ITP and splenomegaly. Almost all her symptoms improved with prednisone and cyclophosphamide, but her thrombocytopenia was refractory to immunosuppression, IVIG, and platelet transfusions. Her platelets recovered after splenectomy. She remained off prednisone and immunosuppressants with disease in remission. Patient #3 had incidental findings of hepatic and splenic lesions on a CT scan intended for renal colic. Despite a focal non-caseating granuloma seen on bone marrow biopsy, he did not have any cytopenias or systemic symptoms. He is currently not on immunosuppressive therapy. On review of the literature, the common clinical features of bone marrow involvement in sarcoidosis are peripheral cytopenias and fever of unknown origin. Corticosteroids are the most common treatment used with some case reports also having success with methotrexate and TNF-alpha inhibitors.

Conclusion: We reviewed 3 unusual cases of sarcoidosis involving bone marrow with severity ranging from asymptomatic to severely cytopenic with secondary ITP. Symptomatic disease typically responds well to corticosteroids. Other treatments such as disease-modifying anti-rheumatic drugs and biologics are not as frequently used, although some benefit has been seen in case reports.

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Patient with Systemic Arthritis Develops Systemic Lupus Erythematosus After Acquiring Persistent Antibodies to Extractable-Nuclear-Antigens Following Tocilizumab Treatment

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Background: Tocilizumab, a monoclonal interleukin 6 (IL-6) antagonist, is approved for use in systemic and polyarticular course JIA. Tocilizumab is generally well-tolerated aside from isolated cases of anaphylactoid reactions and macrophage activation syndrome. We report on a patient treated with tocilizumab for presumed systemic JIA (sJIA), who later developed systemic lupus erythematosus (SLE).

Case Presentation: JD is a 9-year-old Chinese female who presented unwell with high quotidian fevers for 7 weeks, small and large joint polyarthritis, and transient erythematous rash to her nose and arms. Initial investigations showed normocytic anemia (Hb 97) without bicytopenia, raised inflammatory markers (ESR 57, Ferritin 243, CRP normal) and ANA, negative ENAs, RF, dsDNA, and normal liver enzymes. Infections and malignancy were reasonably excluded. Following diagnosis with sJIA, JD was treated with naproxen and prednisone but she remained dependent on high dose steroids. Three weeks after sJIA diagnosis, she was started on intravenous tocilizumab 12mg/kg/dose given every 2-weeks. She had an excellent initial response with resolution of fever and arthritis. Immediately following the third tocilizumab infusion, and over a 5-day period, JD developed severe facial and periorbital swelling to the point that she had difficulty opening her eyes. An ultrasound showed no vascular compression. She had newly acquired high titre SSA (238), but had no other autoantibodies and normal complement. Tocilizumab was discontinued and facial swelling resolved. One month later, JD had recurrence of polyarthritis. Treatment with anakinra and methotrexate was only partially effective. JD then developed several rashes (serpiginous on the back, lacy erythema on the arms, and annular on the scalp) more consistent with SLE than sJIA, as was histology of the annular rash from punch biopsy. Serologies showed persistent lymphopenia, DAT+ anemia, high titre SSA, low titre SCL-70 and RNP, normal C3/C4 and negative dsDNA. The diagnosis of SLE was made, and treatment changed to azathioprine. Patient showed resolution of polyarthritis and tolerated the prednisone taper.

Conclusion: In our patient, it is unclear whether tocilizumab had a direct role in the acquisition of specific autoantibodies and development of lupus, or whether she would have developed lupus regardless of tocilizumab. The potential role of tocilizumab in unmasking or triggering SLE warrants further investigation.

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ANCA-Associated Glomerulonephritis in a Patient with Systemic Lupus Erythematosus: A Case Report

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Background: We report a case of AAV with pauci-immune GN, LCV and MM in a patient presenting with clinical manifestations and serological markers compatible with SLE.

Case Presentation: A 64-year-old Caucasian female was referred to advanced medical dermatology following a longstanding investigation of a subcutaneous infiltrated painful 20 cm plaque on her right hip and thigh with surface peau d'orange changes. Biopsy results and clinical distribution were compatible with lupus panniculitis. Past medical history included hypertension and osteoarthritis. Assessment was significant for photosensitivity, non-scarring alopecia, oral ulcers and arthralgias. Acute renal injury was noted (creatinine 120 umol/L), with urine analysis showing strong proteinuria (8g/24 hours) and microscopic hematuria (> 100 erythrocytes/hpf). Serologic testing revealed positive ANA (1/2560), anti-dsDNA (106 IU), SSA and SSB, along with a high ESR, lymphocytopenia, inflammatory anemia, and normal complement levels. Following kidney biopsy, the patient was started on high dose glucocorticoids and mycophenolate mofetil (MMF) with the presumptive diagnosis of systemic lupus erythematosus (SLE) with lupus nephritis (LN). Renal biopsy showed glomerulonephritis with 13 cellular crescents; immunofluorescence, performed twice, was negative. Renal biopsy was therefore consistent with pauci-immune crescentic glomerulonephritis (GN). Interestingly, new onset palpable purpura developed on her lower extremities with histology consistent with leukocytoclastic vasculitis (LCV). The patient also complained of mild paresthesia in the extremities which were confirmed to be caused by mononeuritis multiplex (MM) on electromyography. Interstitial lung disease (ILD) was noted on the chest CT-scan, with unremarkable bronchoscopy or bronchoalveolar lavage. Long-awaited PR3-ANCA were positive with a titer of 6.0 (normal:0.0–0.9 AI). Anti-GBM were negative. Although the patient initially presented with symptoms and serologies of SLE, ANCA-associated vasculitis (AAV) was diagnosed based on the presence of LCV, pauci-immune GN, MM, ILD and positive PR3-ANCA. The original treatment of MMF was stopped, and replaced by intravenous cyclophosphamide for a standard AAV induction therapy. Complete remission of both GPA and SLE manifestations was obtained after four months of induction therapy. Maintenance of remission is currently achieved with azathioprine.

Conclusion: We report the first case of AAV with pauci-immune GN, LCV and MM in a patient presenting with clinical manifestations and serological markers compatible with SLE. LN is characterized by the presence of immune complex deposition on renal biopsy, while pauci-immune GN typically shows absence of immune deposits on immunohistochemistry. While pauci-immune GN is associated with AAV, only rare cases are associated with lupus. Clinicians should be aware of the possible concomitant presentations of SLE and AAV. This case highlights the importance of obtaining tissue biopsies, as our patient would have received the wrong induction therapy if AAV was missed.

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ANCA-Associated Vasculitis Presenting as Giant Cell Arteritis: A Case Report and Review of the Literature

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Background: We describe herein a case of severe systemic microscopic polyangiitis (MPA) initially presenting with giant cell arteritis (GCA) symptoms.

Case Presentation: A 75-year-old man was admitted for urgent percutaneous coronary intervention (PCI) in the context of acute coronary syndrome. On admission, he was taking 20 mg of daily oral prednisone, as two months prior, he was diagnosed with GCA proven with temporal artery biopsy (TAB) in a community hospital. He had presented with scalp tenderness, jaw claudication, constitutional symptoms, and elevated CRP (148 mg/L). Past medical history was significant for non-specific interstitial pneumonia and coronary artery disease. In the days following PCI, the patient developed persistent hemoptysis without significant hypoxemia. Endoscopy did not reveal any endobronchial lesions. Chest CT-scan was compatible with alveolar hemorrhage. Hematuria and mild proteinuria without acute kidney injury were also documented. Additional work-up revealed positive MPO-ANCA (above 8). There were no skin, neurologic, articular or ocular symptoms. Lung or kidney biopsy was not performed due to the dual antiplatelet therapy following PCI. Severe systemic MPA was diagnosed based on alveolar hemorrhage, nephritis, interstitial lung disease and positive MPO-ANCA. The patient received standard induction therapy (corticosteroids and cyclophosphamide). The diagnosis of GCA was challenged as it seemed unlikely that the patient had two distinct primary vasculitides within three months. The previous TAB was reviewed and showed a focally necrotizing vasculitis without giant cells, affecting a small arteriole adjacent to the temporal artery, but not the temporal artery itself. These findings were histologically consistent with a small vessel vasculitis (SVV).

Conclusion: While cases of ANCA-associated vasculitis (AAV) and SVV affecting the surrounding small branches of the temporal artery and presenting as GCA have been reported, it is an underrecognized phenomenon. In a review of 141 TAB by Genereau et al., 4.5% of patients with an initial diagnosis of GCA had SVV. In a series by Esteban et al. of 58 patients with either SVV or biopsy proven GCA, the presence of fibrinoid necrosis and sparing of the temporal artery vasa vasorum was associated with SVV. In another series of 354 cases of TAB by Cavazza et al., SVV was initially missed in more than 50% of cases. Vasculitis on TAB which spares the vasa vasorum, lacks giant cells, and includes foci of fibrinoid necrosis, should raise suspicion of a vasculitis other than GCA. In these cases, a thorough evaluation and workup for SVV should be considered.

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A Curious Case of An Orbital Mass

Tenneille Tana (Queen's University, Kingston); Tanveer Towheed (Queen's University, Kingston)

Background: This case report will discuss assessing for rheumatologic diseases in patients with the below presentation.

Case Presentation: A 75-year-old female who was seen in referral for query autoimmune process given orbital mass biopsy showing non-necrotizing granulomas and negative IgG and IgG4 stain. Her family medical history was negative for autoimmune or cancer, and her personal history was significant for hypothyroidism and no other autoimmune diseases. She initially presented with symptoms in 2017 with right eye blurriness and fullness, and was diagnosed with bilateral intraocular increase in pressure. She was offered and underwent iridotomy in April or May 2017. Shortly thereafter, she noticed new right eye ptosis and a year later, she had increasing right-sided orbital swelling and diplopia. A CT head showed large soft tissue mass in the superior right orbit measuring just under 3cm, with the posterior aspect of the mass extending posteriorly to the level of the mid orbit with intraconal involvement. The mass is inseparable from the superior aspect of the right globe with downward mass effect on the globe and optic nerve, causing a proptotic globe. Her left orbit was otherwise unremarkable. A biopsy was taken, and the pathology report showed non-necrotizing granulomatous inflammation involving fibroadenosis skeletal tissue. There were foreign body type giant cells and histiocytes surrounded by lymphocytes, with negative stains for IgG and Ig4. Special stains for infectious

organisms were negative. The histologic features were not classic for GPA given the absence of necrotizing inflammation and vasculitis. Pathology felt the > 1cm provided was sufficient and did not think re-biopsing would be helpful, even though the findings of vasculitis can be focal. When seen, she denied any constitutional symptoms. She had a negative CTD and vasculitis history, with no motor or sensory changes other than the inability to look up in her right eye. Pupils were equal and reactive. No enlarged glands, lymphadenopathy, or organomegaly. Investigations showed negative ANCA, ANA, ENA, and dsDNA. She had a normal C3/4, RF, antiCCP, CRP, ESR, SPEP, and LFTs. Her IgG subclasses were normal with IgG1 11.3, IgG2 2.88, IgG3 0.33, IgG4 0.671. Her CXR normal, repeat CT orbit unchanged, and negative CT chest, abdomen, pelvis for lymphadenopathy and organomegaly. Given this, GPA, Sjogren's disease, sarcoidosis, IgG4-RD, and infection were ruled out.

Conclusion: This case report discussed assessing for rheumatologic diseases in patients with the above presentation, and scrutinized the diagnosis of idiopathic orbital inflammatory disease, which is a diagnosis of exclusion.

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Atypical Denosumab-Induced Metatarsal Fractures
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Background: This a case report of atypical denosumab-induced metatarsal fractures, complicated with osteoporosis risk factors.

Case Presentation: A 59-year-old female had lupus overlap with Sjogren's Syndrome and a positive anti-cardiolipin, resulting in lupus pericarditis, 2 DVT's, and a miscarriage. Her other co-morbidities include B cell MALT lymphoma (rituximab, cyclophosphamide, prednisone), osteopenia, and nodular pulmonary amyloidosis. She has been managed with prednisone 5mg po daily for 7 years, hydroxychloroquine, vitamin D, pantoprazole, warfarin, ramipril, and rosuvastatin. She recently discontinued denosumab SC after taking it for approximately 5 years. She remotely sustained a left thumb fracture after falling off a bike. Over the last 2 years, she had multiple fragility fractures. In fall of 2017, in an atraumatic fashion, she stepped out of the shower and sustained a right D5 metatarsal fracture. In May 2018, she was swinging golf club and suffered a left D4 metatarsal transverse fracture at the proximal diaphysis. Her x-ray showed increased lucency across the shaft fracture, and this was non-surgically managed with an aircast. In Aug 2018, while walking, she re-fractured her right D5 metatarsal and sustained a new fracture to her right D2 metatarsal. At this point in time, 1.5 years had passed and her left fracture had still not healed, and therefore she underwent a non-union open reduction internal fixation. Post-operative x-rays showed healing, and a bone biopsy that was sent was negative for malignancy. Her risk factors for osteoporosis include early menopause at the age of 39, chronic prednisone use, and use of a proton-pump inhibitor, rituximab, cyclophosphamide, and warfarin. Other than of French and Irish descent, she is not sure about her family history as she is adopted. She consumes approximately 2 serving of dairy daily. She is a 4-year ex-smoker who quit at 20 years old. Secondary work up for osteoporosis was negative with no concerns for malabsorption. Recent 2019 bloodwork shows Ca 2.33, PO4 1.16, and 25-OH vit D 86. Her BMD score had L1-L4 T-score at -1.5.

Conclusion: This is the first case report of atypical denosumab-induced metatarsal fractures, although this has been complicated with osteoporosis risk factors including chronic steroids and other drugs. Previous case reports had documented atypical metatarsal fractures with bisphosphonates and atypical femoral fractures with denosumab. Thus, clinicians should consider asking patients for symptoms and consider assessing for insufficiency stress fractures, as well as consider discontinuing denosumab if metatarsal fractures are found.

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Missed Doses and Discontinuation of Infliximab in a Population-Based Cohort: Comparisons of Biosimilar and Originator Exposures

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Objectives: To describe users of infliximab in the US, comparing patient tolerability of biosimilar and originator, in terms of missed doses and discontinuation

Methods: We used Marketscan data (Jan-Dec. 2017) to identify adult (age > 18) new users of infliximab biosimilar and originator, and switchers from originator to biosimilar. Characteristics (age, sex, comorbidities, medication use) were described. In new users, we assessed missed doses in both the induction (among subjects with > 2 months follow-up) and the maintenance phases. 'Missed dose' was defined as any gap between infusions beyond recommended intervals (0, 2, and 6 weeks for induction and Q8 weekly for maintenance). Discontinuation (≥ 90-day gap between infusions without restarting therapy) in the maintenance phase was also assessed. We used Cox regression to compare both times to first missed dose and complete discontinuation. All models were adjusted for age, sex, prior use of DMARDs, biologics, and systemic glucocorticoids, comorbidities (Charlson comorbidity index) and underlying disease indication (rheumatoid arthritis, ankylosing spondylitis, psoriasis/psoriatic arthritis, Crohn's disease, and ulcerative colitis).

Results: We identified 318 users of infliximab biosimilar, including 206 switchers from the originator infliximab. Among the 92 new users of infliximab biosimilar with > 2 months follow-up, the frequency of > 1 missed dose during induction was 22%, similar to 25% in new users of the originator. For patients completing the induction phase, the adjusted hazard ratio (HR) showed a nonsignificant trend for a longer time to first missing dose in maintenance (adjusted HR 0.33, 95% CI 0.08-1.30). We were unable to determine if complete discontinuation differed between the two groups (HR: 0.82; 95% CI: 0.11-6.02).

Conclusion: We documented low use of infliximab use in these US data during 2017; most infliximab biosimilar initiators are switchers from the originator. For previously infliximab-naïve patients, the frequency of > 1 missed dose during infliximab induction phase was similar in the originator and the biosimilar new users. As the frequency of biosimilar use grows, additional analyses with more follow-up time may help determine if there are differences in persistence between biosimilars and their reference therapy.

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Effectiveness of a Patient-customized Interdisciplinary Fragility Fracture Liaison Service: Results of a Quasi-randomized Pragmatic Controlled Trial

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Objectives: The literature suggests that patient-customized interdisciplinary fragility fracture (FF) interventions enhance the effectiveness and efficiency of the management of patients who sustained FF. To ensure that those interventions truly translate into fewer fractures, it is crucial to interconnect both fall prevention and post-fracture screening programs, which are called Fracture liaison service (FLS). Although FLS is a cost-effective

model of care for patients with FF, limited evidence exists on such integrated versions of the intervention – combining primary, secondary care and public health services. The main objective of this project was to evaluate the effectiveness of a FLS which integrated community-based fall prevention programs with post-fracture management.

Methods: A quasi-randomized pragmatic controlled trial was conducted. An FF secondary prevention program was implemented in four regions in Quebec, Canada. The intervention integrated orthopaedic surgeons and bone specialists, primary care physicians and nurses, as well as local and provincial fall prevention programs. Participants from control sites (n = 5) received usual post-FF care. Males and females 50+ years of age who had sustained an FF within three months of the recruitment date were invited to participate. Outcomes were collected through telephone interviews every 3 month over an 18-month period.

Results: 464 and 161 participants were recruited (mean age 68, 85% females) in the intervention and control groups, respectively. No significant effects of the intervention were observed on age-, sex- and FRAX score-adjusted refracture rates (OR 1.6; 95% CI 0.6, 4.0) and time before the first fracture (OR 0.6; 95% CI 0.2, 1.6). Number of fallers was not statistically different between study groups (33% intervention vs. 37% control; p = 0.129). The intervention favored initiation of an anti-osteoporosis treatment (54% intervention vs. 28% control; p < 0.001) for untreated patients at baseline as well as adherence to weekly moderate to intense physical activity (45% intervention vs. 31%; p = 0.017). Participation in organized community-based fall prevention program was rather modest (35%).

Conclusion: Although our FLS were effective to increase treatment initiation and physical activity, the intervention failed to prevent refracture and incidence of falls 18-month post-fracture. Results highlight the importance of a personalized approach towards the fall prevention/physical activity component of the FLS. All health professionals involved in the fracture prevention continuum must be aware of the existence of local fall prevention programs. Personalized referral to diversified programs, adapted to the at-risk population, is key to improve adherence to FLS services.

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Sustained Clinical Remission Results from the Canadian Early Arthritis Cohort Study (CATCH): Newmarket Site Perspective

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Objectives: CATCH has enrolled approximately 3500 patients since 2007, and the Newmarket site has contributed over 550 patients. Previous studies have shown that compared with other CATCH sites the Newmarket site has a significantly lower penetration of biologic agents while achieving comparable clinical outcomes. The objectives of this study were to: (1) Understand the DMARD treatment pattern and corresponding rate, duration and prognostic factors for sustained remission in a subset of Newmarket CATCH site and; (2) Explore the frequency of medication-free remission within this site.

Methods: Retrospective chart review that included CATCH patients, from a single site, single treating physician, enrolled and followed from inception of recruitment in 2008-2018 with follow-up data for a minimum of 6 months. Patients in remission were defined as having a Clinical Disease Activity Index (CDAI) score ≤ 2.8 for two consecutive visits which were at least 6 months apart. Patients in LDA (Low Disease Activity) were not included. Descriptive statistics were used to summarize results as means, raw numbers and percent.

Results: Of the 197 patients followed at the single site, 86 patients (43.65%) were in remission with 17 (8.63%) being in medication-free remission. Remission patients had a mean age of 55 ± 14 and 73.5% were female, mean baseline Rheumatoid Disease Comorbidity Index (RDCI) was 1.13 ± 1.21, DAS28 ESR was 4.96 ± 1.58 and DAS28 CRP was 4.77 ± 1.28. This is compared to non-remission patients with mean age 59.42 ±

12.68, 66% female, mean baseline RDCI 1.38 ± 1.28, DAS28 ESR 4.95 ± 1.31 and DAS28 CRP 4.69 ± 1.15. Overall, median time to remission was 17.5 months. Monotherapy with csDMARD was sufficient in (65) 75.58%, dual csDMARD therapy (3) 3.49%, biologics (0) 0% and azathioprine (1) 1.16%. Of the 86 patients in remission, only 4 (4.65%) were given concomitant IM corticosteroid during the average 43.63 ± 35.75 months of remission, only 2 (2.33%) were given oral steroids and 10 (11.63%) were administered intra-articular injections.

Conclusion: This single site retrospective study demonstrated sustained clinical remission is achievable in almost half of our early rheumatoid arthritis patients with about one-fifth being drug-free remissions. For those still on DMARDs a majority of them have been able to achieve remission with csDMARD monotherapy, with very few having had to ever use oral, intra-muscular or intra-articular steroids during their remission period. The unique observation of achieving sustained remission without the use of biologic response modifiers warrants further study.

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Cardiovascular Risk Biomarker Distributions in Inflammatory Arthritis

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Objectives: Inflammatory arthritis (IA) is associated with cardiovascular disease (CVD). Cardiac biomarkers may assist with CVD risk stratification, but this has not been well studied in IA. We aimed to estimate the prevalence of elevated cardiac biomarkers in IA and describe patient and disease-related correlates of cardiac biomarkers.

Methods: A cross-sectional study of patients enrolled in the University of Toronto Cardio-Rheumatology Network was performed. This is a primary CVD prevention program with structured clinical, laboratory and imaging assessments to diagnose and treat CVD. Patients are eligible if they have rheumatoid arthritis (RA) or spondyloarthropathy (SpA, psoriatic arthritis or ankylosing spondylitis), and no documented CVD. We included patients with complete baseline data for 5 cardiac biomarkers and examined the prevalence of elevated biomarkers according to site-specific lab cut-offs: high-sensitivity troponin T (hs-TnT) (≥ 15 ng/L), N-terminal prohormone BNP (NT-proBNP, ≥ 35 pmol/L or 100 pg/mL), Apolipoprotein A1 (ApoA1, ≥ 1.96 g/L), Apolipoprotein B (ApoB, ≥ 1.17g/L or ≥ 1.46g/L) and Lipoprotein a (LpA, ≥ 9.7mg/dL or ≥ 30mg/dL). We performed logistic regression to evaluate for associations with each biomarker, adjusted for IA diagnosis, age, inflammatory markers, joint counts, and CVD risk factors.

Results: A total of 234 participants were included. The majority had RA (N = 144), followed by PsA (N = 69) and AS (N = 21). Mean (SD) age of the sample was 59 (10.5) years and 69% were female. Mean joint counts and acute phase reactants reflected well controlled disease and most were treated with DMARDs (64%) or biologics (43%). At least 1 CVD risk factor was present in 77% of subjects, most commonly current/past smoking (51%), hypertension (31%) or dyslipidemia (28%). Fifteen percent had elevated hs-TnT and 19% had elevated NT-proBNP. Elevated lipid biomarkers occurred in 41%, primarily due to a high prevalence of LpA (33%), with lower prevalence of anti-atherogenic ApoA1 (11%) or atherogenic ApoB (3%). Increasing age was associated with elevated hs-TnT (OR 1.10, 95%CI 1.06-1.15). RA diagnosis associated with higher ApoA1 (OR 3.11, 95%CI 1.10-8.83); younger age was associated with both ApoA1 (OR 0.96, 95%CI 0.92-0.99) and ApoB (OR 0.92 95%CI 0.87-0.98). Increasing ESR was associated with elevated LpA (OR 1.04, 95%CI 1.02-1.07).

Conclusion: Elevations in cardiac biomarkers are common even in well-controlled IA patients with no known CVD. The implications of this are unknown and will require long-term CVD follow up. Additional

research is needed to determine if biomarkers are responsive to changes in disease activity, which may be another rationale for a treat-to-target approach in IA.

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Pro-inflammatory Role of Neutrophil Serine Proteinases in Proteinase-Activated Receptor-2 (PAR2) Pathway Activation in Psoriatic Arthritis

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Objectives: Psoriatic arthritis is a chronic inflammatory arthritis that affects 30% of patients with cutaneous psoriasis and causes severe joint pain. Inflamed joints are characterized by thicker synovial lining, hypervascularity, and increased infiltration of polymorphonuclear leukocytes in synovial tissues. The identification of many neutrophil serine proteases in the synovial fluid (SF) microenvironment of PsA suggests its key role in mechanisms that drive persistent psoriatic joint inflammation. Proteinase-activated receptor-2 (PAR2) is a G protein-coupled receptor activated by the proteolytic cleavage of an N-terminal tethered ligand. It couples with the TRPV4 ion channel to ultimately act upon the calcineurin–nuclear-factor of activated T-cells (NFAT) axis to prolong cytokine-induced responses. The overall hypothesis is that proteolytic activation of PAR2 regulates neutrophil differentiation and function and contributes to the chronic inflammation characterizing PsA. But a proof-of-concept investigation is required to establish and identify the ability of specific blood-derived serine proteinases to trigger cell signaling responses (i.e. elevation of intracellular Ca2+) in the PAR2 pro-inflammatory pathway.

Methods: Primary neutrophils were isolated from blood of PsA patients and action of SF-derived proteinases that activated PARs were interrogated with its inhibitors using fluorescence-generated values. PAR2 neutrophil cell signaling was manipulated using its respective agonists and antagonists and secreted cytokine levels were monitored and measured. Mass spectrometry and functional proteomics were then used to identify specifically released serine proteases.

Results: Results demonstrated that upon PAR2 activation, the generated sigmoidal curve indicated a signaling pathway. The PAR2 agonist was most effective at concentrations of 300uM–500uM. A dose response curve for the TRPV4 ion channel was created with an EC50 of $267.22\mu M$.

Conclusion: The data established proof-of-concept that PAR2 expression in neutrophils plays a pathogenic role in the chronic inflammatory symptoms associated with PsA and its respective antagonists can lead to novel therapies targeting the neutrophil-PAR2 pathways. This assay paves path for future investigations targeting other components of the PAR2 pro-inflammatory pathway to develop therapeutics mediating the inflammatory symptoms of PSA.

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Factors Implicated in the Development of Early Osteonecrosis in Systemic Lupus Erythematosus

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Objectives: Osteonecrosis (ON) complicates approximately 15-20% of patients with systemic lupus erythematosus (SLE) on an average of six years after diagnosis. However, some patients develop ON early, sometimes in a few weeks after treatment initiation. It is possible that these patients display an increased "end-organ sensitivity" and, in turn, an increased responsiveness to the administered treatment (glucocorticoids). The aim of this study was to evaluate if patients who develop early ON achieve better disease control over time compared to individuals with late ON.

Methods: Inception patients (enrolled within 18 months of diagnosis) who developed symptomatic ON were retrieved from the database and divided into four quartiles based on the time to ON development. Patients in the first quartile were compared to individuals of the remaining three quartiles as per the demographic, clinical, immunological and therapeutic characteristics. Outcomes also included the adjusted mean SLE Disease Activity Index-2000 (SLEDAI-2K) from diagnosis until the development of ON and the severity of ON (affected joints/patient at ON diagnosis, at 12 months after ON and at the last visit). Descriptive statistics were used.

Results: Ninety-seven inception patients developed ON in 0.1-19.9 years from diagnosis. Twenty-three patients developed ON within 1.3 years (1st quartile, mean 1.2 ± 0.6 years) whereas 74 developed ON later (2nd-4th quartiles, mean 7.4 ± 5.2 years). There were no significant differences regarding age, sex distribution and race/ethnicity between the two groups. Patients with late ON had a higher initial SLEDAI-2K (12.9 ± 10.2 vs. 9.6 ± 7, $p < 0.001$) and prednisone dose (39.2 ± 25.6 vs. 26.9 ± 17.2, $p < 0.001$). For the first 12 months since diagnosis (approximately the time of early ON development), the average daily prednisone dose (21.6 ± 12.1 vs. 21.3 ± 10.7mg/day) and the cumulative prednisone dose (10.5 ± 7.1 vs. 9.4 ± 5.5grams) were similar between groups. The evolution of the mean clinical SLEDAI-2K for the first seven years from diagnosis (approximately the time of late ON development) in the two groups did not show any significant difference at any time point. Osteonecrosis severity was comparable between groups both at ON diagnosis (1.46 vs. 1.43 affected joints/patient), at 12 months after ON (1.78 vs. 1.91 affected joints/patient) and at the last visit (3.3 vs. 2.87 affected joints/patient).

Conclusion: The early ON group had a lower disease activity score, lower initial steroid dose and a similar cumulative dose at one year but developed ON within 1.3 years of diagnosis. Thus, other factors, such as genetic predisposition and organ responsiveness may be implicated in early development of ON.

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Do All Patients Who Achieve Lupus Low Disease Activity State Have Similar Outcomes?

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Objectives: Lupus Low Disease Activity State (LLDAS) has been associated with favourable outcomes in systemic lupus erythematosus (SLE). However, the complexity of its defining criteria (SLEDAI-2K ≤ 4, no major organ involvement, no new clinical manifestation, no increase in Physician's Global Assessment, daily prednisone dose ≤ 7.5mg/day and stable doses of antimalarials, immunosuppressives and biologics) allows for considerable heterogeneity among these patients. The aim of the present study was to describe the major LLDAS phenotypes in inception patients first achieving LLDAS with emphasis on the likelihood of flare.

Methods: Inception patients (enrolled within 18 months since diagnosis) who achieved LLDAS for two consecutive visits from January 2000 to December 2016 were included. All patients were followed for at least two years and divided into major phenotypes as follows: glucocorticoid use (or not), clinical SLEDAI-2K ≤ 2 on antimalarials only (or not) and serologically active clinically quiescent (SACQ) disease (or not). The likelihood of disease flare (any deviation from LLDAS) was assessed over the next 2 and then 5 years. SAS 9.4 was used for statistics; $p < 0.05$ was considered significant.

Results: Four hundred twenty-one patients achieved LLDAS for two consecutive visits; 357 had at least two years and 295 had at least five years of follow-up. At two years, 149/357 (41.7%) patients flared after 1.1 years on average whereas at five years 206/295 (69.8%) patients flared after 1.9 years on average. Patients on glucocorticoids flared more frequently than patients on no glucocorticoids at two (46.8% vs. 35.1%, $p = 0.026$) and five years (75.6% vs. 62.2%, $p = 0.013$). Patients with a clinical SLEDAI-2K ≤ 2 on antimalarials only flared less frequently than their counterparts at two (30% vs. 47.8%, $p = 0.002$) and five years (59.8% vs. 75.5%, $p = 0.005$). There were no differences in the flare rates between SACQ and non-SACQ patients.

Conclusion: Within the LLDAS population, patients who achieved a clinical SLEDAI-2K ≤ 2 on antimalarials only as well as the patients who were not treated with glucocorticoids developed significantly less flares over 2 and 5 years. These findings suggest that the use of glucocorticosteroids or immunosuppressives and the nature of the clinical manifestations impact the ability of LLDAS to predict flares over the next 2 and 5 years.

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Response To Placebo In Randomized Clinical Trials With Biologics In Non-renal, Non-neuropsychiatric Systemic Lupus Erythematosus: A Systematic Review and Pooled Analysis

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Objectives: Most randomized controlled trials (RCTs) with biologics in systemic lupus erythematosus (SLE) failed to reach their respective end-points with the rates of the response to placebo (plus standard of care treatment) being unexpectedly high. The aim of this systematic review was to quantify the response to placebo for different end-points in the RCTs in non-renal, non-neuropsychiatric lupus patients.

Methods: The PubMed database was searched from 2000 to April 2019 for phase II/III RCTs that assessed the efficacy and safety of biologic drugs in human non-renal, non-neuropsychiatric SLE at 48 or 52 weeks after randomization. Data on efficacy (primary and secondary end-points) and safety (serious adverse events, serious infections, malignancies and deaths) of the placebo-treated patients were collected in a pre-established data retrieval form. Descriptive statistics were used.

Results: Thirteen RCTs (n = 8382 in total) were included. Placebo-treated patients (n = 2818) were mostly females (93.9%) and Caucasians (62.2%) with a mean age of 39.4 ± 2 years and mean disease duration of 6.5 ± 1.9 years. Their initial SLE Disease Activity Index 2000 (SLEDAI-2K) was 10.5 ± 1.1 whereas 61% were positive for anti-dsDNA antibodies, 43.2% had low C3 and 37.9% low C4 at randomization. Their standard of care (SOC) treatment included glucocorticosteroids in 86.4% (mean dose 12 ± 3.1mg/day, prednisone > 7.5mg/day 55.4%), antimalarials in 68.1% and immunosuppressives in 44.9%. The response rates of the placebo-treated patients for the primary end-point (as defined by each study) was 36.3%, for SLE Responder Index-4 (SRI-4) 39.2%, for SRI-5 27.8%, for SRI-6 26.9% and for the BILAG Composite Lupus Assessment (BICLA) 33%. Other outcomes included the proportion of patients who reduced their daily prednisone dose to ≤ 7.5mg/day (15.3%) and proportion of patients who normalized their anti-dsDNA titers (7.8%), complement C3 (20.5%) and C4 (16.5%). The sample size in 10 studies was calculated with an expectation of an average 15% difference between the active drug and placebo (range 12-20%) in achieving the primary endpoint; the actual difference was 9% on average (range 1.2-17.9%). Regarding safety, there were 17.1% serious adverse events with 6.4% serious infections, 0.5% malignancies and 0.67% deaths.

Conclusion: More than one third of the patients treated with placebo plus SOC achieved their respective primary end-points in RCTs with biologics in non-renal, non-neuropsychiatric SLE. The response rate was even higher for certain endpoints, such as the SRI-4, while it decreased with more stringent endpoints. The analysis of the reasons of this phenomenon may offer important information for the design of future RCTs.

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Rapid Progression to End Stage Renal Disease in Lupus Nephritis: Poor Compliance and Distinct Histopathologic Features are the Main Associated Factors

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Objectives: Lupus nephritis (LN) may lead to end-stage renal disease (ESRD) in 17% over 10 years with the risk being particularly high (up to 34%) in diffuse proliferative forms. The rate of renal function decline varies; however, "catastrophic" course [≥ 20 ml/min/1.73 m2/year of the estimated glomerular filtration rate (eGFR) up to the time of dialysis] is uncommon. The aim of this study was to assess the factors associated with rapid progression to ESRD in patients with LN.

Methods: Inception patients from the Lupus Clinic with biopsy-proven LN at presentation and eGFR > 60 ml/min/1.73 m2 who developed ESRD within three years were retrieved from the database. Pathology reports were reviewed with particular emphasis on distinct histopathologic features. Demographic, clinical, laboratory and therapeutic variables were retrieved from the database.

Results: Ten patients (1.8% of the total biopsy-proven LN population) developed ESRD within three years of diagnosis. Their mean age was 34.9 ± 6.5 years, mean time to ESRD development 19.2 ± 14.4 months, initial serum creatinine = 84 ± 15.6μmol/L, eGFR = 90 ± 23.5 ml/min/1.73 m2, proteinuria 2.7 ± 0.93 grams/24h and serum albumin 32.1 ± 3.7grams/L. The rate of renal function decline was more than 47 ml/min/1.73 m2/ year on average. Five patients had diffuse proliferative LN (class IV), 2 membranous LN (class V), 2 had mixed proliferative/membranous (class IV/V) and one patient had focal proliferative LN (class III). In addition, two patients had extensive thrombotic microangiopathy (TMA, one in the context of catastrophic antiphospholipid syndrome), one collapsing glomerulonephritis and one concomitant anti-glomerular basement membrane (anti-GBM) nephropathy (all with LN class IV). Severe interstitial inflammation was detected in two patients (one class IV, one class IV/V). In these 6 patients, severe podocyte effacement was reported in three patients and severe tubuloreticular inclusions in two (both class IV/V). Four patients showed no unusual renal pathology. Remission induction therapy included glucocorticosteroids (mean daily prednisone dose 53.3 ± 10mg/day, six patients received intravenous pulses of methylprednisolone), immunosuppressives (cyclophosphamide in 3/10, mycophenolate mofetil in 5/10, azathioprine in 2/10), rituximab in two patients, and therapeutic plasma exchange in the patient with LN IV/anti-GBM nephritis. Nine were concomitantly treated with hydroxychloroquine and 5/10 with angiotensin converting enzyme inhibitors (ramipril 5-10 mg/day). All 4 patients without unusual histopathologic features had severe non-compliance based on self-report (discontinued all their medications against medical advice to follow alternative treatment).

Conclusion: Catastrophic progression to ESRD is uncommon in LN. The major associated factors are poor compliance and distinct histopathologic features such as severe interstitial inflammation, podocyte effacement, thrombotic microangiopathy, collapsing glomerulopathy and concomitant anti-GBM nephropathy.

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Antimalarial-Induced Cardiomyopathy: Outcome in 10 patients

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Objectives: Antimalarial-induced cardiomyopathy (AMIC) is a hypertrophic cardiomyopathy with conduction system disorders, cardiac biomarker abnormalities and a short-term mortality of 45%. Data on the reversibility of the disease are sparse. The aim of this study is to assess the evolution of AMIC in the long term in patients with systemic lupus erythematosus (SLE).

Methods: Ten patients with SLE who developed AMIC were analyzed (mean age at diagnosis 63 ± 8.7 years, mean disease duration 32.8 ± 12.7 years, mean antimalarial treatment duration 22.4 ± 9.4 years). Diagnosis was confirmed by myocardial biopsy in three patients (extensive cardiomyocyte vacuolation, intracytoplasmic myelinoid and curvilinear bodies)

and considered probable in another seven cases based on a combination of abnormal cardiac biomarkers (high sensitivity troponin I and brain natriuretic peptide, BNP), hypertrophic cardiomyopathy (based on cardiac magnetic resonance, CMR) and the exclusion of other causes (coronary artery disease, uncontrolled hypertension). Other types of idiopathic hypertrophic cardiomyopathy and/or Anderson-Fabry cardiomyopathy were excluded by genetic testing.

Results: Mean follow-up after AMIC diagnosis was 23.7 ± 10.7 months; antimalarials were discontinued in all patients, while diuretics were commenced or intensified in three. One patient died three months after diagnosis due to refractory heart failure. Left ventricular hypertrophy regressed in 3/10 patients whereas septal hypertrophy regressed in 1/10. Left atrial enlargement regressed in 5/10. Systolic dysfunction was present in one patient who had a complete recovery; diastolic dysfunction was milder in 3/10 and unaltered in the rest. Conduction system abnormalities developed in three patients 12-24 months after drug discontinuation (one complete atrioventricular block, two with paroxysmal atrial fibrillation). The median reduction of troponin I (7/10 patients) was 29.7% at one year, 53.1% at two years and 74.1% at three years (compared to baseline). The median reduction of BNP (6/10 patients) was 49% at one year, 81.3% at two years and 68.8% at three years (compared to baseline).

Conclusion: Recovery of the structural (left ventricular and septal hypertrophy, left atrium enlargement), functional (systolic and diastolic dysfunction) and biochemical variables (troponin I, BNP) occurs in most patients with AMIC but this is slow and often incomplete even after two years. Conduction abnormalities may still develop many months after drug withdrawal.

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The Impact of the New American College of Cardiology/American Heart Association Definition of Hypertension on Cardiovascular Events in Systemic Lupus Erythematosus

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Objectives: The 2017 American College of Cardiology/American Heart Association guidelines defined hypertension at ≥ 130/80mmHg for the systolic and diastolic blood pressure (BP) respectively. Studies on patients with connective tissue diseases were not considered. The aim of the present study was to assess the impact of this definition on atherosclerotic vascular events (AVEs) in systemic lupus erythematosus (SLE).

Methods: Individuals from the Toronto Lupus Clinic with at least two years of follow-up and no prior AVE up to that time were divided in three groups according to their adjusted mean BP over the first two years (≥ 140/90 mmHg, 130-139/80-89 mmHg and < 130/80 mmHg). They were followed until the first occurrence of an AVE (fatal or non-fatal coronary artery disease, cerebrovascular event and peripheral vascular disease) or last visit. Groups were compared as per the baseline traditional and disease-related atherosclerotic risk factors. A multivariate time-dependent analysis was performed to adjust for the presence of other risk factors. Statistical analysis was conducted with SAS 9.4; p < 0.05 was considered significant.

Results: Of 1532 patients satisfying the inclusion criteria, 155 (10.1%) had a mean adjusted BP ≥ 140/90 mmHg over the first two years, 316 (20.6%) had 130-139/80-89 mmHg and 1061 (69.3%) were normotensives. After a mean follow-up of 10.8 years, 124 AVEs (20 cardiovascular deaths) were documented. The incidence rates were 18.9, 11.5 and 4.5 per 1000 patient-years for the three groups respectively (p = 0.0007 between the 130-139/80-89 mmHg group and the normotensives). Similar trends (gradually increasing incidence rates from the normotensives to the 130-139/80-89 mmHg and the ≥ 140/90 mmHg groups) were observed for coronary artery disease, cerebrovascular disease and cardiovascular deaths. In multivariate regression analysis (adjusted for the traditional and disease-related atherosclerotic risk factors), a mean adjusted BP of 130-139/80-89 mmHg over

the first two years was independently associated with the occurrence of AVEs [HR = 1.914, 95% CI = 1.252-2.927, p = 0.003].

Conclusion: Lupus patients with a mean BP of 130-139/80-89 mmHg over the first two years had a significantly higher incidence of AVEs compared to normotensive individuals. This BP level should be the target for antihypertensive therapy to minimize their cardiovascular risk.

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Transition From Pediatric to Adult Rheumatology: The Clinician as a Fundamental Ally

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Objectives: The transition from pediatric to adult rheumatology has been linked to poor outcomes in the absence of comprehensive transition programs. Several tools are available to measure transition readiness. Transition success is influenced by patient age and family history of disease, yet little is known about the impact of patient-provider relationship on transition readiness. In our multidisciplinary transition clinic, adolescents with juvenile Systemic Lupus Erythematosus (jSLE) or Juvenile Idiopathic Arthritis (JIA) are seen by both pediatric and adult rheumatologists concurrently, along with a nurse, child life specialist and physiotherapist with advanced rheumatology training. This study evaluated (1) readiness for transition among patients in a transition clinic, (2) patients' perceptions of the patient-provider relationship, and (3) the potential association between these factors.

Methods: Patients (age 14-19) with jSLE or JIA were recruited from transition clinics at a single academic institution. Participants completed 2 questionnaires. The Consultation and Relational Empathy Scale (CARE) questionnaire (10-items, max score 50) evaluates patients' perception of physicians' care and empathy on a 5-point Likert scale (poor-excellent). The TRANSITION-Q, a validated 14-item questionnaire (max score 100), assesses healthcare self-management skills as a proxy for readiness to transition to adult care. Descriptive statistics were summarized for patient characteristics and questionnaire scores. Spearman correlation analyses determined the association between each of age and disease duration and scores for the CARE and TRANSITION-Q questionnaires. Multivariable linear regression analyses determined the association between CARE and TRANSITION-Q scores accounting for age and disease duration.

Results: Among 42 participants (mean (SD) age 16.7 (1.2) years, 62% female), 37 had JIA and 5 jSLE (mean disease duration 4.9 years). Mean (SD) CARE and TRANSITION-Q scores were 45.5 (5.1) and 61.0 (13.9), respectively. Mean TRANSITION-Q scores appeared to increase with age. There was a moderately positive correlation between CARE and TRANSITION-Q scores (rs 0.3282, p = 0.0338). The regression model with total CARE score, age and disease duration was significantly associated with TRANSITION-Q scores, F(3,38) = 3.05, p = 0.036, adjusted R2 = 0.1306.

Conclusion: Readiness for transition from pediatric to adult rheumatology appears to increase with patient age and with favorable perceptions of the patient-provider relationship. Interventions to improve transition care should not only focus on the improvement of self-management skills but should ensure that the clinician is perceived as a fundamental partner during this process. Future outcomes of this study will explore the effect of changes in CARE on TRANSITION-Q scores.

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Challenges Faced by Families of Children with an Auto-inflammatory Disease

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Objectives: Auto-inflammatory diseases (AIDs) are a group of rare disorders that usually present in young children. Disease episodes, characterized by recurrent episodes of inflammation, are often frequent and unpredictable, and long-term outcomes are variable. AIDs are not easily recognized by community health professionals, and diagnosis may thus be delayed. Our study objective is to understand the challenges families experience prior to and after their child is diagnosed with an AID.

Methods: Parents of children followed in the AID Clinic at BC Children's Hospital (BCCH) between May-August 2019 were asked to participate. Parents completed a survey aimed to identify challenges faced prior to their child's diagnosis, and resources families found helpful after the diagnosis. Likert-scale and open-ended questions were included. Open-ended question results were grouped into themes for reporting. Summary descriptive statistics were applied as appropriate. General demographic and clinical information (child's current age, diagnosis and age at diagnosis) were also collected.

Results: Fifty families completed the survey ; their respective children with an AID had a median age of 11 y (range 4 - 18 y), 56% male. Time from onset of AID symptoms to diagnosis was median 2 y (range 0.5 - 12 y). Other family members with an AID were reported in 16% of families. The most frequent diagnoses were PFAPA (n = 17), CRMO (n = 11), unclassified (n = 7) and FMF (n = 6). At time of their child's diagnosis, 70% of parents reported having difficulty getting medical attention for their child's illness, 78% worry about child's daily function and future, and the majority of parents noted a negative impact on their work (58% missing time from work, 62% changing work schedule), and significant parental stress, anxiety, and fatigue. Open-ended questions revealed (i) parents feelings were not taken seriously by medical providers when seeking care, (ii) anxiety regarding diagnostic uncertainty, (iii) lack of confidence caring for their sick child, (iv) child missing school and activities, and (v) parents missing work to care for their ill child. The most common resources parents used for support and information were health care professionals in the BCCH AID Clinic and online parent support groups.

Conclusion: Parents of children with AIDs share common challenges prior to their child's diagnosis, including a substantial impact on their work and personal wellness. This needs assessment provides guidance for the development of education in the area of AIDs and parent support services that will improve coping for families with newly diagnosed children with AID.

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Impact of Gender and Age on Psoriatic Arthritis Patient Profiles at Golimumab Initiation and 12-Month Outcomes

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Objectives: Gender and age have been previously identified as independent predictors of response to anti-TNFs. The aim of this analysis was to compare, between genders and age groups, the profile and outcomes of psoriatic arthritis (PsA) patients treated with golimumab during routine Canadian care.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients with PsA who initiated treatment with subcutaneous golimumab were included. Patients were grouped into age tertiles: Young: 19.7–47.0

years; Middle: 47.1–59.3; Old: 59.4–85.4) and further stratified by gender. The impact of age and gender on outcomes and retention were assessed with multivariate logistic and cox regressions, respectively, adjusting for age tertile, gender, and respective outcome at baseline.

Results: 281 patients were included with a mean (SD) age of 52.8 (13.2) years and disease duration of 6.1 (7.7) years. Across age tertiles, significant differences (p < 0.05) were observed at baseline in disease duration, weight, employment status, insurance coverage, previous smoking status, previous/concomitant use of oral steroids, HAQ-DI, TJC28, and SJC28. Gender, RF status, anti-CPP status, family history, current smoking status, previous/concomitant use of DMARDs, NSAIDs, or MTX, number of previous DMARDs, experience with biologics, enthesitis, and dactylitis, and PASI were statistically comparable. Between genders, significant differences were observed in weight, employment status, number of previous DMARDs, concomitant NSAIDs, and baseline HAQ-DI, TJC28, and SJC28. Based on multivariate regression, patients in Young age tertiles (OR [95% CI]: 9.44 [3.88–23.0]) and Middle (2.5 [1.05–5.95]), along with male patients (2.07 [1.03-4.18]), were more likely to achieve MDA-LDA at 6 months. Compared to Old age tertile, achievement of MDA-LDA at 12 months (3.40 [1.36–8.48]), VLDA at 6 (6.69 [2.09–21.4]) and 12 (6.59 [1.92–22.7]) months, and HAQ < 0.5 at 6 (7.68 [3.23–18.3]) and 12 (4.84 [1.98–11.82]) months were more likely among patients in Young age tertile. Male patients were less likely have enthesitis (0.37 [0.15–0.87]) at 6 months and dactylitis at both 6 (0.27 [0.08–0.97]) and 12 (0.17 [0.03–0.88]) months. There was no association between age tertile or gender and PASI75 achievement. In terms of safety, notable differences were observed across genders and age tertiles in both adverse event incidence and profile. Furthermore, male gender (HR [95% CI]: 1.66 [1.14-2.44]), but not age tertile, was associated with higher odds of retention.

Conclusion: Significant variations in baseline characteristics, treatment outcomes, and safety profile exist across age groups and gender.

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Frequency and Determinants of Delayed Start of Golimumab Therapy in Psoriatic Arthritis Patients and Impact on Outcomes

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Objectives: Biologic initiation by psoriatic arthritis (PsA) patients followed in routine clinical care is often delayed due to unfamiliarity with utilization management criteria and lag in prescription filling, which could lead to suboptimal treatment outcomes. This analysis aimed at describing the time elapsing between prescription and injection of golimumab treatment in Canadian real-world practice, identifying patient and clinic determinants of such delays, and assessing the potential impact on treatment outcomes.

Methods: This is a post-hoc analysis of data from the Biologic Treatment Registry Across Canada (BioTRAC). Patients initiating treatment for PsA with subcutaneous golimumab were included. Predictors of delayed administration were explored among clinic (site region: Western [Alberta, British Columbia, Saskatchewan], Ontario, Quebec and the Maritimes setting; location: rural vs. urban) and patient (age tertiles, gender, disease duration tertiles, cDAPSA28 tertiles, prior biologic experience, and type of insurance coverage [private vs. public vs. other]) characteristics using the independent-samples median test and multivariate generalized linear models. The impact of injection delays on outcomes (minimal disease activity [MDA], very low disease activity [VLDA], PASI75, HAQ < 0.5, absence of enthesitis and dactylitis) was assessed with logistic regression adjusting for age, gender, and baseline levels.

Results: 281 patients were included with a mean (SD) age of 52.8 (13.2) years, disease duration of 6.1 (7.7) years, with the majority being bio-naive (77.9%), seen in Ontario (50.9%) and from urban settings (94.5%). Median

time to first golimumab injection from baseline was 3.1 weeks (interquartile range: 4.4) with 97 (34.5%) of patients experiencing no delay (zero days). In univariate analysis, median time to first injection was significantly shorter in Quebec (0 weeks) compared to other regions (3.3-4.4 weeks; p < 0.001); no differences were observed across age tertiles (p = 0.116), gender (p = 0.963), disease duration tertiles (p = 0.904), cDAPSA28 tertiles (p = 0.160), prior biologic experience (p = 0.533), site location (p = 0.427), nor type of insurance coverage (p = 0.153). In multivariate analysis, upon variable selection, investigator site region was identified as the single significant independent predictor of delayed golimumab administration with patients in Quebec showing the shortest time to first injection (2.6 weeks) compared to the remaining regions (range: 4.2-5.8). In terms of outcomes, no statistically significant associations with time to golimumab administration were observed.

Conclusion: These results indicate that significant delays exist among PsA patients with respect to the first dose of golimumab following prescription which were significantly higher among patients with longer disease duration. This could be explained by difference between region and payer types.

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Impact of Region and Registry Site Size on Psoriatic Arthritis Patient Profile at Golimumab Initiation and 12-Month Outcomes

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Objectives: Access to care and management of psoriatic arthritis (PsA) patients may differ based on Canadian region and extent of physician familiarization with treatments. This analysis aimed at comparing the profile and outcomes of PsA patients treated with subcutaneous golimumab in real-world across Canada and biologic treatment registry sites of different sizes.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients initiating treatment for PsA with golimumab were included. Provinces were regrouped by region. Based on the tertile distribution of the number of golimumab-treated PsA patients enrolled in BioTRAC, sites were classified as; low enrolling: 1-6 patients; medium enrolling: 7-16 patients; high enrolling: > 16 patients. Logistic and cox regressions were used to assess the impact of region and site size on outcomes and treatment retention while adjusting for age, gender, and baseline levels.

Results: 281 patients were included with a mean (SD) age of 52.8 (13.2) years and disease duration of 6.1 (7.7) years. Across regions, significant differences were observed in insurance coverage (p < 0.001), number of prior DMARDs (p < 0.001), and concomitant use of DMARDs (p < 0.001). Across site sizes, significant differences were observed in age (p = 0.040), insurance coverage (p = 0.001), and baseline dactylitis (p = 0.020). In multivariate analysis, patients from Maritimes were less likely to have dactylitis (0.02 [0.001-0.94]) at 6 months but also less likely to achieve minimal disease activity (MDA) (OR [95%CI]: 0.13 [0.02-0.88]) at 12 months compared to Western Canada. Patients from medium (3.10 [1.06-9.07]) and high enrolling (4.23 [1.27-14.06]) sites were more likely to achieve MDA at 6 months compared to low enrolling sites; furthermore, a statistical trend (p = 0.087) was observed for achievement of HAQ < 0.5 at 12 months with patients from high enrolling sites showing higher odds (2.34 [0.88-6.19]) compared to low enrolling sites. No impact of either region or site size was observed in MDA achievement at 6 months, and VLDA achievement, PASI 75 achievement, and enthesitis at either timepoint. In terms of treatment retention, no significant differences were observed based on either Canadian region or registry site size. Remarkable differences were observed between regions (highest in Quebec and Western Canada) and site sizes (highest in high enrolling sites) in overall AE incidence.

Conclusion: These results indicate that significant regional variation in the management of PsA patients, and outcomes exist within the BioTRAC

registry. In addition, improved outcomes were observed in high enrolling sites, possibly due to greater experience with golimumab treatment.

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Mapping Real-World Ankylosing Spondylitis Patients to Clinical Trial Eligibility Criteria

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Objectives: Results of real-world studies may be extrapolated to overall patient populations, whereas clinical trials outcomes can be limited in generalizability due to stringent eligibility criteria. This analysis sought to assess the proportion of ankylosis spondylitis (AS) patients treated with golimumab in Canadian routine care qualifying for the pivotal randomized controlled trial (RCT), and to explore potential differences in outcomes.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients with AS who initiated treatment with subcutaneous golimumab were categorized as "Eligible" or "Non-Eligible" based on the inclusion/exclusion criteria of the GO-RAISE RCT. Reasons for non-eligibility, as well as between-group differences in baseline characteristics were assessed with univariate statistics. Impact of eligibility on achievement of the following clinical outcomes at 6/12 months was assessed using logistic regression adjusting for respective baseline clinical activity. Treatment retention was compared using the log rank test. Safety was evaluated through incidence of adverse events (AEs).

Results: 357 patients were included: 184 (51.5%) were considered Eligible and 173 (48.5%) were considered Non-Eligible for GO-RAISE. Primary exclusionary reasons were baseline BASDAI and spinal pain scores < 4 (n = 59/173 [34.1%] and 42/173 [24.3%], respectively), no prior DMARD/NSAID use (55/173; 31.8%), and previous biologic use (n = 62/173; 35.8%). Significantly greater (p < 0.05) baseline functional impairment and disease activity was observed in Eligible vs. Non-Eligible patients for mean [SD] HAQ-DI (1.2 [0.6] vs. 0.9 [0.6]), BASFI (6.8 [1.5] vs. 5.3 [2.4]), BASDAI (5.8 [2.2] vs. 4.8 [2.7]), and ASDAS (3.6 [0.8] vs. 3.2 [1.1]). No impact of eligibility on outcomes was observed, except Month 12 achievement of HAQ < 0.5 which was 55% less likely in Non-Eligible patients (OR [95%CI]: 0.45 [0.23-0.93]; p = 0.03). Treatment retention, although lower for Eligible vs. Non-Eligible patients (Median [SE]: 1.6 [0.3] vs. 2.3 [0.3] years), was statistically comparable (p = 0.167). ≥1 AE was reported by 74.5% (n = 137/184) of Eligible and 71.1% (n = 123/173) of Non-Eligible patients.

Conclusion: Almost half of AS patients treated with golimumab in routine care would not have been eligible for GO-RAISE. Non-eligibility was driven primarily by deviations in prior medication use and disease activity thresholds. Real-world effectiveness, retention and safety were comparable. BASDAI > 4 may be too restrictive since this study indicates comparable response rates and retention even with baseline BASDAI < 4. Real world patients reflect a broader spectrum of AS than that seen in RCTs (shorter disease duration, lower BASDAI and BASFI) yet show comparable response rates.

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Impact of Gender and Age on Rheumatoid Arthritis Patient Profiles at Golimumab Initiation and 12-Month Outcomes

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Objectives: Gender and age have been previously identified as independent

predictors of response to anti-TNFs. The aim of this analysis was to compare, between genders and age groups, the profile and outcomes of rheumatoid arthritis (RA) patients treated with subcutaneous golimumab during routine Canadian care.

Methods: This is a post-hoc analysis of data from the Biologic Treatment Registry Across Canada (BioTRAC). Patients with RA who initiated treatment with golimumab were included. Patients were grouped into age tertiles (Young: 19.4–52.7 years; Middle: 52.8–63.7; Old: 63.8–90.4) and further stratified by gender. The impact of age and gender on outcomes (SDAI LDA [≤ 11], CDAI LDA [≤ 10], SDAI remission [≤ 3.3], CDAI remission [≤ 2.8], and HAQ < 0.5) and treatment retention were assessed with multivariate logistic and cox regressions, respectively, adjusting for age tertile, gender, and respective outcome at baseline.

Results: 530 patients were included (76.2% female) with a mean (SD) age of 57.7 (13.0) years and disease duration of 8.0 (8.3). Across age tertiles, significant differences (p < 0.05) were observed at baseline in gender, disease duration, weight, employment status, insurance coverage, current/previous smoking status, previous use of DMARDs, NSAIDs, or MTX, number of previous DMARDs, and baseline HAQ-DI and SJC28. No statistically significant differences were noted in RF and anti-CPP status, family history, previous use of oral steroids, experience with biologics, concomitant medications, or baseline TJC28, CDAI and SDAI. Between genders, significant differences (p < 0.05) were observed in age, weight, previous smoking, HAQ-DI, and experience with biologics. Based on multivariate regression, male patients were more likely to achieve SDAI-LDA at 6 (OR [95% CI]: 2.08 [1.13–3.82]) and 12 months (2.34 [1.11–4.93]), as well as HAQ-DI < 0.5 at 6 months (1.91 [1.04–3.52]). Furthermore, patients in Young age tertile vs. Old were more likely to achieve SDAI remission (4.17 [1.53-11.36]) and HAQ-DI < 0.5 (2.39 [1.20–4.76]) at 6 months. No statistically significant differences were observed in the remaining outcomes. Adjustment for weight tertiles, did not eliminate the effect of gender on outcomes. Across age tertiles, AE incidence was generally comparable, while SAE incidence, particularly infections and neoplasms, was substantially higher among older patients. Between genders, AE incidence was slightly higher among female patients while SAEs were more common in males. No differences in retention were observed between either predictor.

Conclusion: Significant variations in baseline characteristics, treatment outcomes, and safety profiles exist across age groups and genders within the BioTRAC registry.

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Impact of Region and Registry Site Size on Rheumatoid Arthritis Patient Profile at Golimumab Initiation and 12-Month Outcomes

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Objectives: Access to care and management of RA patients may differ based on Canadian region and extent of physician familiarization with treatments. This analysis aimed at comparing the profile and outcomes of RA patients treated with golimumab in real-world across Canada and biologic treatment registry sites of different sizes.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients initiating treatment for RA with subcutaneous golimumab were included. Provinces were regrouped by region. Based on the tertile distribution of the number of patients enrolled, sites were classified as; low enrolling: 1-9 patients; medium enrolling: 10-33 patients; high enrolling: > 33 patients. Logistic and cox regressions were used to assess the impact of region and site size on outcomes and treatment retention while adjusting for age, gender, and baseline levels.

Results: 530 patients were included. Across regions, significant differences were observed in insurance coverage (p < 0.001), anti-CCP positivity (p =

0.019), previous biologic exposure (p = 0.005), number of prior DMARDs (p < 0.001), and concomitant use of DMARD(s) (p = 0.004) or oral steroids (p = 0.011). However, there were no statistically significant differences in baseline disease duration, disease activity (CDAI) and functional activity (HAQ). Across site sizes, significant differences were observed in employment (p = 0.026), health insurance type (p = 0.023), number of prior DMARDs (p < 0.001), concomitant use of DMARDs (p = 0.017) or oral steroids (p = 0.016), and baseline CDAI (p < 0.001) and HAQ (p = 0.001). In multivariate analysis, patients from Ontario were less likely to achieve CDAI remission (OR [95%CI]: 0.35 [0.13-0.98]) and HAQ < 0.5 (OR [95%CI]: 0.31 [0.11-0.86]) at 12 months compared to Western Canada. No impact of either region or site size was observed in CDAI LDA at 6 and 12 months, CDAI remission at 6 months, SDAI LDA or remission at 6 and 12 months, and HAQ < 0.5 at 6 months. In terms of treatment retention, patients from high enrolling sites were more likely to stay on golimumab treatment (HR [95%CI]: 0.68 [0.49-0.97]) for a longer period compared to low enrolling sites. Region was not associated with treatment retention. Remarkable differences were observed between regions in overall adverse events (highest in Quebec and Western Canada), but not SAE, incidence. Site size was not associated with number of reported AEs/SAEs.

Conclusion: These results indicate that significant regional variation in baseline characteristics, patient management, and outcomes exist within the BioTRAC registry. In addition, a trend towards earlier initiation of golimumab treatment and significantly improved retention on treatment was observed in high enrolling sites.

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Efficacy and Safety of Repository Corticotropin Injection in Patients With Persistently Active Rheumatoid Arthritis: Results From a 2-Part Multicenter Clinical Trial

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Objectives: Despite the use of multiple disease-modifying anti-rheumatic drugs (DMARDs), many patients with rheumatoid arthritis (RA) have persistently active disease. Both the American College of Rheumatology and the European League Against Rheumatism suggest only short-term use of corticosteroids (CSs) in such cases. Repository corticotropin injection (RCI), a naturally sourced complex mixture of purified adrenocorticotropic hormone analogs and other pituitary peptides, stimulates CS production and is an agonist for all 5 melanocortin receptors (MCRs). Activation of MCRs by RCI has anti-inflammatory and immunomodulatory effects. RCI is approved by the US Food and Drug Administration as a short-term adjunctive therapy for RA. The purpose of this 2-part, multicenter, placebo-controlled phase 4 study was to assess the efficacy and safety of RCI in subjects with persistently active RA (ClinicalTrials. gov ID: NCT02919761).

Methods: Adults with persistently active RA despite DMARD and CS use received 80 U RCI (subcutaneously [SC] 2x/wk) during an initial 12-week open-label period (Part 1). The primary efficacy endpoint was the proportion of subjects with LDA (Disease Activity Score with 28 joint count and erythrocyte sedimentation rate [DAS28-ESR] < 3.2) at week 12. Subjects who achieved low disease activity (LDA) at week 12 were eligible for the double-blind period (Part 2). Eligible subjects were randomized to either 80 U RCI or matching placebo (SC, 2x/wk) during the 12-week double-blind maintenance period and remained on their stable doses of DMARD and CS. Safety was assessed via adverse event (AE) reports.

Results: Of 259 enrolled subjects, 231 (89%) were women; mean age was 51 years. At week 12, 163 subjects (62.9%, p < 0.0001) had achieved LDA. Treatment-related AEs were reported by 16.6% of patients. Of the 153 subjects (RCI, n = 77; placebo, n = 76) who entered the double-blind period,

127 (83%) completed the study. At week 24, the proportion of patients maintaining LDA was significantly greater for RCI- versus placebo-treated patients (61.0% vs 42.1%; p = 0.019). The rate of treatment-related AEs was similar for placebo- (13.0%) and RCI-treated (11.7%) patients. Three subjects experienced serious AEs (SAEs), all during the open-label period: chest pain (n = 1), pneumonia (n = 1), and craniocerebral injury (n = 1), with pneumonia being the only treatment-related SAE.

Conclusion: In this study of subjects with persistently active RA despite CS/DMARD therapy, most participants achieved LDA by week 12 of RCI therapy. During the double-blind period, RCI was associated with better maintenance of LDA than placebo. No new safety signals were identified. Top 10 Poster

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Discrepancy Between the Multi-Biomarker Disease Activity Score and Clinical Disease Activity Scores in the Open-label Period of a 2 Part, Multicenter Study of Repository Corticotropin Injection for Patients With Persistently Active Rheumatoid Arthritis

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Objectives: Assessment of disease activity (DA) in patients with rheumatoid arthritis (RA) using validated measures, such as the Disease Activity Score with 28 joint count and erythrocyte sedimentation rate (DAS28-ESR) and the Clinical Disease Activity Index (CDAI), is useful in evaluating therapeutic efficacy. The multi-biomarker disease activity (MBDA) score was developed to provide an objective laboratory assessment of DA. We evaluated DAS28-ESR, CDAI, and MBDA scores in the open-label period of a 2-part, multicentre, randomized, placebo-controlled study of repository corticotropin injection (RCI), a naturally sourced complex mixture of adrenocorticotropic hormone analogs and other pituitary peptides, in patients with active RA despite treatment with a stable corticosteroid dose and 1 or 2 conventional and/or biologic disease-modifying antirheumatic drugs (ClinicalTrials.gov ID: NCT02919761).

Methods: Patients received 80 U of open-label RCI subcutaneously twice weekly for 12 weeks. DA was assessed via DAS28-ESR, CDAI, and MBDA at baseline and week 12; changes from baseline were evaluated via 1-sample t tests. Correlations between the MBDA and both the DAS28-ESR and CDAI were assessed via Pearson correlation coefficients for scores at baseline and week 12 and for the change in scores from baseline to week 12. All analyses were conducted using the modified intent-to-treat population (i.e. subjects who received ≥ 1 dose of study drug and contributed any efficacy data).

Results: Open-label RCI therapy led to clinically meaningful improvements in DA. Mean decreases in DAS28-ESR (–2.75) and CDAI (–26.60) exceeded minimal clinically important difference thresholds[1,2]; whereas the mean decrease for MBDA score (–2.9) did not.[3] Although statistically significant correlations were noted between MBDA scores and both DAS28-ESR and CDAI scores at baseline and week 12, correlation coefficients suggested only weak relationships (baseline: DAS28-ESR, 0.336 [p < 0.001]; CDAI, 0.131 [p = 0.036]; week 12: DAS28-ESR, 0.269 [p < 0.001]; CDAI, 0.141 [p = 0.026]). For changes from baseline, similar statistically significant but weak correlations between MBDA and both DAS28-ESR (0.252 [p < 0.001]) and CDAI scores (0.186 [p = 0.003]) were observed.

Conclusion: Changes in clinical DA scores correlated only weakly with changes in MBDA scores, which suggests that MBDA scores may not be as reliable an indicator of DA as previously thought and/or that MBDA scores reflect other aspects of RA than do DAS28-ESR and CDAI scores. Additional research is warranted to explore possible reasons behind this discrepancy. References: 1. Ward MM, et al. Ann Rheum Dis. 2015;74(9):1691-1696. 2. Curtis JR, et al. Arthritis Care Res. 2015;67(10):1345-1353. 3. Chernoff D, et al. Clin Rheumatol. 2019;38(2):437-445.

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Predictors of Response, Adverse Events and Treatment Retention in RA Patients Treated with Either Subcutaneous- or Intravenous-Golimumab in a Prospective, Observational Registry

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Objectives: BioTRAC was a prospective, observational registry that enrolled rheumatoid arthritis (RA) patients treated with either subcutaneous golimumab (GLM-SC) or intravenous golimumab (GLM-IV) between 2010 and 2017.

Methods: Patient visits occurred at baseline and every 6 months thereafter. Multivariate logistic regression was used to identify independent predictors of achieving specific efficacy and safety endpoints and included the following covariates: age, gender, disease duration, enrolment period, concomitant medication, smoking and employment.

Results: A total of 530 GLM-SC and 157 GLM-IV-treated patients were enrolled and followed for a mean of 2.0 and 1.6 years, respectively. DAS28-CRP LDA was more likely to be achieved with lower baseline DAS28-CRP [OR (95% CI): 0.73 (0.57–0.92); p = 0.009], among those with concomitant DMARD use [2.86 (1.35–6.08); p = 0.006], and in patients who were employed [2.26 (1.18–4.33); p = 0.014]. However, it was less likely among those with baseline concomitant CS use [0.55 (0.30–0.99); p = 0.047]. DAS28-CRP remission was more likely to be achieved in males [OR (95% CI): 2.06 (1.10–3.86); p = 0.023], later enrolment [2013–2015 vs. 2010–2012: 1.91 (1.02–3.59); p = 0.045], and among those with concomitant DMARD use [3.15 (1.53–6.51); p = 0.002] and less likely in patients with concomitant CS use [0.37 (0.22–0.62); p < 0.001]. A HAQ < 0.5 was more likely to be achieved with lower age [OR (95% CI): 0.98 (0.96–1.00); p = 0.023), in males [2.00 (1.10–3.67); p = 0.024], lower baseline HAQ scores [0.13 (0.08–0.20); p < 0.001] and higher baseline CRP levels [1.01 (1.00–1.02); p = 0.009]. AEs were more likely with lower baseline CDAI [OR (95% CI): 0.98 (0.97–1.00); p = 0.023], and in patients with baseline concomitant CS [1.62 (1.04–2.52); p = 0.032] or NSAID use [1.79 (1.19–2.70); p = 0.005], whereas SAEs were less likely in patients enrolled later [2013–2015 vs. 2010–2012: 0.42 (0.23–0.79); p = 0.007 and 2016–2017 vs. 2010–2012: 0.18 (0.08–0.44); p < 0.001], and in those with baseline DMARD use [0.37 (0.18–0.79); p = 0.009]. Early treatment period (2013–2015 vs. 2016–2017: 0.58 [0.39–0.87], p = 0.008) and concomitant DMARD use [0.58 (0.37–0.90); p = 0.016] increased the likelihood of treatment continuation.

Conclusion: In RA patients treated with golimumab, concomitant DMARD use appears to be a positive predictor of achieving treatment targets, avoiding SAEs and treatment retention. Patients with concomitant CS at baseline were less likely to meet efficacy endpoints and at higher risk of AEs. Finally, patients enrolled later had a higher likelihood of discontinuation.

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Application of Treat to Target and Impact of Sustained Low Disease Activity or Remission on Function in Psoriatic Arthritis Patients

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Objectives: Previous analyses have identified enrolment year as an independent predictor of real-world retention on anti-TNF treatment whereby

patients enrolled in later periods were more likely to be switched. The aim of this analysis was to compare between enrolment periods for psoriatic arthritis (PsA) treatment outcomes and frequency of treating to target, and to assess the impact of target type on long-term function.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients were grouped into enrolment periods: 2005-2008, 2009-2012, 2013-2015, 2016-2017. Achievement of MDA (5/7 of: TJC28 ≤ 1, SJC28 ≤ 1, PASI ≤ 1, pain ≤ 15 mm, PtGA ≤ 2 0mm, HAQ ≤ 0.5, tender entheseal points ≤ 1), VLDA (7/7 criteria), and sustained MDA or VLDA (at 6 and 12 months) were compared between enrolment periods with the Chi-square test. The impact of achieving MDA or VLDA at 6 months, 12 months, or both (sustained) on HAQ-DI at 18 months was assessed with one-way ANOVA and generalized linear models.

Results: 392 PsA patients treated with anti-TNFs (IFX: n = 111; GLM: n = 281) were included. Across enrolment periods, a significant increase in baseline age (48.5 vs. 50.3 vs. 51.9 vs. 54.8 years; p = 0.021) was observed. At 6 and 12 months, 44.2% and 45.6% achieved MDA, 18.4% and 19.9% achieved VLDA, while 36.8% and 13.2% achieved sustained MDA and VLDA, respectively, without significant differences across enrolment periods. Among patients not achieving LDA at 6 and 12 months, an intervention was applied in 40-45% of patients, without significant differences between enrolment periods. Between 6 and 12 months, the most common intervention was anti-TNF discontinuation (71.2% of non-LDA achievers), followed by DMARD addition (12.1%), DMARD dose increase (7.6%) or NSAID addition (7.6%). Similar results were obtained post 12 months. Patients achieving sustained MDA, followed by those achieving MDA either at 6 or 12 months had significantly lower HAQ at 18 months compared to patients not achieving MDA at either timepoint (0.2 vs. 0.6 vs. 1.2; p < 0.001). Similar results were observed when evaluating achievement of remission albeit with greater impact on HAQ at 18 months (0.1 vs. 0.2 vs. 0.9; p < 0.001). Adjustment for baseline HAQ did not impact the results.

Conclusion: Target achievement among PsA patients has remained stable over time with relatively infrequent regimen optimization prior to anti-TNF discontinuation. Achieving stricter targets was associated with greater benefits in terms of long-term patient function.

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Predictors of Response, Adverse Events and Treatment Retention in Psoriatic Arthritis Patients Treated with Golimumab in a Prospective, Observational Registry

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Objectives: BioTRAC was a prospective, observational registry that enrolled psoriatic arthritis (PsA) patients treated with subcutaneous golimumab (GLM) between 2010 and 2017.

Methods: Patient visits occurred at baseline and every 6 months thereafter. Multivariate logistic regression was used to identify independent predictors of achieving specific efficacy and safety endpoints and included the following covariates: age, gender, disease duration, enrolment period, concomitant medication, smoking and employment.

Results: A total of 281 patients were enrolled and followed for a mean duration of 1.9 years. The proportion of male gender was 46.3% and the mean disease duration at baseline was 6.1 years. MDA was more likely to be achieved with lower baseline DAS28-CRP [OR (95% CI): 0.62 (0.45–0.84); p = 0.002] and in patients who were employed [2.64 (1.22–5.71); p = 0.014]. VLDA was more likely to be achieved with lower age [OR (95% CI): 0.96 (0.94–0.99); p = 0.005], lower baseline

DAS28-CRP [0.63 (0.44–0.89); p = 0.009] and in patients who were employed [6.45 (2.30–18.27); p < 0.001], whereas VLDA was less likely to be achieved in patients who smoked [0.30 (0.10–0.92); p = 0.035]. DAPSA LDA was more likely to be achieved with lower baseline DAPSA [OR (95% CI): 0.96 (0.94–0.98); p < 0.001]. DAPSA remission was more likely to be achieved with lower age [OR (95% CI): 0.98 (0.95–1.00); p = 0.048] and lower baseline DAPSA [0.98 (0.96–1.00); p = 0.043], while less likely to be achieved with later enrolment [2016-2017 vs. 2010–2012: 0.30 (0.11–0.78); p = 0.014] and in patients who smoked [0.37 (0.15–0.93); p = 0.035]. HAQ < 0.5 was more likely to be achieved in male vs. female gender [OR (95%): 2.03 (1.08–3.83); p = 0.028] and in patients with lower baseline HAQ scores [0.19 (0.11–0.34); p < 0.001]. AEs were more likely to occur with baseline concomitant DMARD [1.97 (1.07–3.63); p = 0.030] or NSAID use [1.88 (1.05–3.37); p = 0.033], yet less likely in male vs. female [0.54 (0.30–0.98); p = 0.043]. SAEs were more likely to occur with older age [1.04 (1.00–1.07); p = 0.041], and less likely in patients enrolled later [2013–2015 vs. 2010–2012: 0.05 (0.01–0.18); p < 0.001 and 2016–2017 vs. 2010–2012: 0.03 (0.01–0.14); p < 0.001]. Being employed at baseline was a significant positive predictor of GLM retention [0.61 (0.38–0.97); p = 0.035].

Conclusion: In PsA patients treated with golimumab, young age, employment and lower disease activity at baseline were associated with better treatment outcomes.

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Intravenous Golimumab for Active Psoriatic Arthritis: Systematic Literature Review and Network Meta-Analyses

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Objectives: To compare FDA-approved targeted therapies for active psoriatic arthritis (PsA) through network meta-analysis (NMA) with a focus on rheumatological outcomes and intravenous (IV) golimumab (GLM).

Methods: A systematic literature review was performed to identify randomized controlled trials (RCTs) from 2000 to present. Two reviewers performed study selection and data collection. Bayesian NMAs were performed to estimate comparisons between treatments for American College of Rheumatology (ACR) 20/50/70 responses, Health Assessment Questionnaire Disability Index (HAQ-DI) score, and modified van der Heijde-Sharp (vdH-S) score. Unadjusted and meta-regression–adjusted NMAs were performed and the best-fitting model was selected. Risk ratios (RR) and mean differences (MD) were used to summarize comparisons along with 95% credible intervals (95%CI).

Results: Twenty-four RCTs were included. Studies were placebo-controlled and evaluated all 11 FDA-approved targeted therapies for PsA. For ACR20, IV GLM was similar to infliximab (IFX) (RR: 1.11; 95%CrI: 0.90-1.38) and etanercept (ETN) (RR: 1.25; 95%CrI: 0.99-1.58) and superior to ixekizumab (IXE) (RR: 1.40; 95%CrI: 1.15-1.72), adalimumab (ADA) (RR: 1.44; 95%CrI: 1.21-1.72), secukinumab 150 mg (SEC150) (RR: 1.51; 95%CrI: 1.25-1.80), and most other treatments. For ACR50, IV GLM was superior to SEC150 (RR: 1.49; 95%CrI: 1.04-2.09) but was similar to most other treatments including IFX (RR: 0.99; 95%CrI: 0.66-1.47), ETN (RR: 1.03; 95%CrI: 0.69-1.51), IXE (RR: 1.21; 95%CrI: 0.83-1.75), and ADA (RR: 1.30; 95%CrI: 0.93-1.78). Similarly, for ACR70, IV GLM was similar to IXE (RR: 1.05; 95%CrI: 0.48-2.26), IFX (RR: 1.11; 95%CrI: 0.47-2.55), ADA (RR: 1.25; 95%CrI: 0.62-2.52), SEC150 (RR: 1.32; 95%CrI: 0.59-2.75), ETN (RR: 2.37; 95%CrI: 0.90-6.21), and most other treatments. Likewise, IV GLM ranked first for HAQ-DI and was similar to ETN (MD: -0.01; 95%CrI: -0.17 to 0.18), IFX (MD: -0.01; 95%CrI: -0.23 to 0.22), and IXE (MD: -0.16; 95%CrI: -0.36 to 0.04), but was superior to ADA (MD: -0.25; 95%CrI: -0.42 to -0.08) and SEC150 (MD: -0.33; 95%CrI: -0.51 to -0.14). For vdH-S, IV GLM was similar to IFX (MD: -0.88; 95%CrI: -1.83 to 0.08) but superior to ETN (MD: -1.84; 95%CrI: -2.53 to -1.15), ADA

(MD: -2.01; 95%CrI: -2.68 to -1.35), SEC150 (MD: -2.07; 95%CrI: -2.79 to -1.35), IXE (MD: -2.08; 95%CrI: -2.75 to -1.42), and all other treatments. Results were similar across sensitivity analyses.

Conclusion: IV GLM offers favourable outcomes for patients with active PsA. IV GLM was consistently the highest-ranked treatment across all rheumatological outcomes assessed but was comparable to IFX, ETN, ADA, IXE, and SEC150 in certain pairwise assessments.

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Patterns of Concomitant Medication Use Over Time in Rheumatoid Arthritis Patients Treated With Golimumab

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Objectives: Achievement of therapeutic response following the addition of anti-TNF agents to existing treatment for rheumatoid arthritis (RA) might lead to down titration or withdrawal of concomitant synthetic DMARDs and/or oral corticosteroids (CS). The aim of this analysis was to evaluate the impact of golimumab treatment on concomitant MTX, DMARD (other than MTX) and CS administration, as well as to explore the impact of concomitant treatment adjustment on golimumab retention, as observed in Canadian routine care.

Methods: This is a post-hoc analysis of the Biologic Treatment Registry Across Canada (BioTRAC). Patients with RA who initiated treatment with subcutaneous golimumab were included. MTX, other DMARDs, and CS withdrawal vs. initiation were compared between baseline users vs. non-users, respectively, with the Chi-square test. Among baseline MTX and CS users, the proportions of patients undergoing dose modification (increase/decrease) and discontinuing treatment were evaluated; discontinuation of other DMARDs was similarly assessed. The impact of MTX and CS discontinuation/dose decrease/dose increase/maintenance, whichever occurred first, on golimumab retention was assessed with the Kaplan Meir estimator of the survival function and Cox regression.

Results: Among the 530 patients included, 357 (67.4%) received concurrent MTX, 103 (19.4%) other DMARD without MTX (70 patients (13.2%) received no DMARD including MTX), and 139 (26.2%) CS. During follow-up (median duration: 21.3 months), a significantly (p < 0.001) greater proportion of patients withdrew vs. added MTX (61.3% vs. 18.5%), other DMARDs (64.1% vs. 7.1%), and CS (65.5% vs. 11.3%). Among baseline MTX users, 38 (10.6%) had ≥ 1 dose increase and 112 (31.4%) had ≥ 1 dose decrease; while, among baseline CS users, 14 (10.1%) had ≥ 1 dose increase and 35 (25.2%) had ≥ 1 dose decrease. Among baseline MTX users, significant (P < 0.001) differences in GLM retention were observed based on MTX dose adjustment, with patients remaining on MTX and maintaining their dose showing the lowest retention. Similarly, among baseline CS users, significant (P < 0.001) differences in GLM retention were also observed based on CS dose adjustment with patients remaining on CS and maintaining their dose and patients increasing their CS dose showing the lowest retention. Analysis of time to discontinuation due to efficacy reasons showed the same results.

Conclusion: Treatment of RA patients with GLM was associated with withdrawal of MTX, other DMARDs and CS in more than half of patients. Optimization of concomitant RA treatment was associated with longer duration of GLM treatment while physician inertia was identified as a significant negative predictor of GLM retention.

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A Multi-disciplinary, Community-based Group Intervention for Individuals with Fibromyalgia: A Pilot Randomized Controlled Trial

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Objectives: To test the implementation of a community-based multidisciplinary group program for individuals with Fibromyalgia (FM), with the goal of equipping patients for sustainable long-term and effective disease self-management.

Methods: A pilot randomized controlled trial was conducted using mixed methods with a 10-week intervention offered to FM patients in a small urban setting. 61 study participants (4 male, 57 female) were recruited and randomized to either control (usual care) or intervention groups. The intervention included a health professional team offering twice weekly personalized exercise and weekly supportive education in small groups with a focus on self-management. Participants completed questionnaires at baseline, post-intervention, and 3-months post-intervention. Assessment tools included standardized measures of FM impact on daily functioning, sleep quality and quantity, mental health, and participants' perceptions of quality of care. Frequency and purpose of emergency department visits over the course of the intervention was accessed via the local health authority database. Participant and provider interviews were completed following the intervention to garner perspectives on the model of care and patient impact.

Results: The primary outcome was patient-perceived quality of FM care, based on the model of integrated care delivered. Secondary outcomes included disease-related functioning and health service utilization. Data showed significant improvements (Cohen's d effect size magnitude of at least 0.3, p < 0.05), relative to control group, from start to end-of-intervention in the following: patient-perceived quality of care in follow-up care (d = 0.61, p = 0.03) and goal setting (d = 0.66, p = 0.04); impact of FM on daily functioning, including depression (d = 0.91, p = 0.005), pain level (d = 0.59, p = 0.03), ability to work (d = 0.69, p = 0.02), and total impact score (d = 0.70, p = 0.02); and attitudes towards pain, including perceived control over pain (d = 0.82, p = 0.01), belief that pain is disabling (d = 0.67, p = 0.03) and perceived physical harm caused by pain (d = 0.61, p = 0.03). Emergency department visits displayed a decreased trend in frequency of visits during, and over 3 months following, the intervention. The post-intervention interviews with both participants and providers revealed positive and helpful experiences with respect to the unique model of care delivered.

Conclusion: Results of the current study suggest that multidisciplinary community-based interventions may be useful in improving FM-related daily functioning, including pain level and beliefs surrounding pain, as well as patient- and provider-perceived quality of FM care. Furthermore, the potential for reductions in health service utilization as an outcome of this self-management intervention offers promising evidence for discussions with healthcare decision-makers, providers, and patients themselves regarding the impact of implementation of such a community-based program. Supported by a CIORA Grant.

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Application of Treat to Target and Impact of Sustained Low Disease Activity or Remission on Function in Rheumatoid Arthritis Patients

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Objectives: The aim of this analysis was to compare between enrolment periods RA treatment outcomes and frequency of treating to target, and to assess the impact of target type on long-term function.

Methods: This is a post-hoc analysis of data from the BioTRAC registry. Patients with RA who initiated treatment with infliximab or subcutaneous golimumab were included. Patients were grouped into enrolment periods: 2002-2004, 2005-2008, 2009-2012, 2013-2015, 2016-2017. Achievement of LDA (CDAI LDA or SDAI LDA or SJC ≤ 1), remission (CDAI remission

or SDAI remission or SJC = 0), and sustained LDA or remission (at 6 and 12 months) were compared between enrolment periods with the Chi-square test and multivariate logistic regression. The impact of achieving LDA or remission at 6 months, 12 months, or both (sustained) on HAQ-DI at 18 months was assessed with one-way ANOVA and generalized linear models.

Results: 1420 patients treated with anti-TNFs (IFX: n = 890; GLM: n = 530) were included. Over calendar time, a significant decrease in baseline disease duration and disease activity scores (CDAI, SDAI, SJC28, TJC28, HAQ) was observed (p < 0.001). Across enrolment periods, significant differences were observed in target achievement with higher rates observed in more recent years. Upon adjusting for baseline CDAI and prior biologic exposure, no differences between enrolment periods were observed in achieving LDA, remission or sustained LDA/remission at 6 months; however, significantly (p = 0.030) higher odds of achieving remission at 12 months were observed in more recent years. Among patients not achieving LDA at 6 and 12 months, an intervention was applied in approximately 40% of patients, without significant differences between enrolment periods. Between 6 and 12 months, the most common intervention was anti-TNF discontinuation (64.9% of non-LDA achievers), followed by DMARD addition (9.8%), NSAID addition (8.8%), or steroid addition (7.2%). Similar results were obtained post 12 months. Patients achieving sustained LDA, followed by those achieving LDA either at 6 or 12 months had significantly lower HAQ-DI at 18 months compared to patients not achieving LDA at either timepoint (0.8 vs. 1.1 vs. 1.4; p < 0.001). Similar results were observed when evaluating achievement of disease remission albeit with greater impact on HAQ-DI at 18 months (0.7 vs. 1.1 vs. 1.2; p < 0.001). Adjustment for baseline HAQ-DI did not impact the results.

Conclusion: Target achievement has increased over time although emphasis in treating to target may be placed in the first 6 months of treatment. Achieving stricter targets was associated with better long-term patient function.

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Infection in Rheumatoid Arthritis Patients Treated with Golimumab

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Objectives: Biologic use in RA is a well-characterized risk factors for infections. The aim of this analysis was to characterize the incidence of infection in RA patients treated with golimumab in Canadian routine care, as well as assess the impact of oral corticosteroid (CS) and DMARD use on infection.

Methods: This is a post-hoc analysis of the BioTRAC registry. Patients with RA who initiated treatment with subcutaneous golimumab were included in this analysis. The incidence density rates (IDR) of total, serious (SI), and non-serious (NSI) infections were calculated for the overall follow-up period as well as by 6-month interval. Negative binomial and cox regressions were used to assess the impact of CS and DMARD use, as well as CS and methotrexate (MTX) dose levels. Time to first infection and time to treatment discontinuation were assessed with the Kaplan-Meier estimator of the survival function, and the impact of concomitant CS and DMARD use was assessed with the log rank test.

Results: 530 patients were included with a mean (SD) age of 57.7 (13.0) years and disease duration of 8.0 (8.3) years. Of these 74 (14.0%) were treated with ≤ 15mg/week MTX, 280 (52.8%) with > 15mg/week MTX, while 173 (32.6%) were not on MTX. In terms of CS, 72 (13.6%) were treated with ≤ 5mg/day, 63 (11.9%) with > 5mg/day, and 391 (73.8%) were not on CS. Over a mean follow-up duration of 27.0 months, the IDR for total infections, NSI, and SI was 35.10 events/100 PYs, 32.90 events/100 PYs, and 2.23 events/100 PYs. Median estimated time to first infection was 52.9 months (SI: 84.9 months; NSI: 55.1 months). The incidence of total infections was 44.0, 37.3, 35.1, 29.4, 31.1, 35.7, 19.3, 7.4 and 0.0 events/100 PYs at 0-6 months, 6-12 months, 12-24 months, 24-36 months, 36-48 months, 48-60 months, 60-72 months, 72-84 months and 84-90 months, respectively. Longer follow-up duration was significantly associated with higher number of NSI (HR [95%CI]: 1.011 [1.006-1.017]) but not SI (1.011 [0.988-1.035]), while neither the use of DMARD, CS nor MTX was found to have an impact.

Conclusion: Higher IDR was observed during the first 6 months of treatment and decreasing thereafter. CS and DMARD treatment did not impact retention of golimumab treatment. These results support the notion that CS should be used concomitantly with anti-TNF for the shortest period possible to achieve remission, and then tapered.

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Impact of Tofacitinib on the Individual Components of the ACR Composite Score in Patients With Rheumatoid Arthritis: A Post Hoc Analysis of Phase 3 Trials

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Objectives: Tofacitinib is an oral JAK inhibitor for the treatment of RA. In clinical trials, standard criteria for measuring treatment efficacy in patients with RA include ACR response rates, composite scores that represent ≥ 20/50/70% improvement in seven components of disease activity. This post hoc analysis evaluated the impact of tofacitinib 5 mg BID + csDMARDs, and placebo, on each ACR component.

Methods: Efficacy data for tofacitinib 5 mg BID and placebo were pooled from three Phase 3 placebo-controlled trials (NCT00847613; NCT00856544; NCT00853385) of tofacitinib + csDMARDs in csDMARD inadequate responder patients with RA. Endpoints summarized descriptively included proportions of patients achieving: ACR20/50/70 responses, and ≥ 20/50/70% improvements from baseline in ACR components (TJC, SJC, CGA, PtGA, Pain, HAQ-DI, and CRP) from Week (W)2 through Month (M)6, and mean percent improvement from baseline in ACR components for ACR20 responders at M3.

Results: Compared with placebo-treated patients, greater proportions of tofacitinib-treated patients achieved ≥ 20% improvement from baseline in all ACR components by W2, with proportions generally increasing through M6. Overall, through M6, numerically higher proportions of patients achieved ≥ 20/50/70% improvements for primary components (TJC and SJC) vs the secondary components CGA, PtGA, Pain, and HAQ-DI; among secondary components, ≥ 20% improvement rates were numerically highest for CGA, excepting CRP at W2 and M1 in tofacitinib-treated patients. In contrast, at W2, ≥ 50% and ≥ 70% improvement rates with tofacitinib were numerically higher for PtGA (19.4% and 6.8%, respectively) and Pain (16.7% and 6.1%, respectively) vs CGA (16.3% and 5.4%, respectively). Among tofacitinib-treated ACR20 responders at M3, mean percent improvement from baseline was > 70% for primary components, and ranged from 18.6–58.9% for secondary components.

Conclusion: Tofacitinib was associated with rapid and sustained improvements in all ACR components. Across treatment arms, TJC, SJC, and CGA (physician-reported measures) contributed more to the achievement of ACR20 response vs PtGA, Pain, and HAQ-DI (patient-reported outcomes), which may reflect differences in measurement properties between these outcome groups. At W2, PtGA and Pain had greater contributions to ACR50/70 responses, which may be attributable to rapid disease activity improvements in a subgroup of patients, highlighting the impact of patients' perception of disease on the achievement of clinically defined outcomes. Overall, although ACR20 response is thought of as a "low" threshold to achieve, these data show that improvements in primary and secondary ACR components far exceed what would be considered a 20% improvement in

response; therefore, these findings may inform expected responses with new therapies in clinical settings.

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Biosimilar Etanercept Use in Rheumatoid Arthritis: The Rhumadata Registry Experience

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Objectives: Our objective was to describe the recent use of bsETA and boETA in patients with RA.

Methods: Data from patients initiating bsETA (either biologic-naïve users, patient transitioning from boETA, swappers and switchers from other biologic agents) were extracted from a practice-based registry for the period of January 2015 to November 2018. For comparison purposes, we identified patients initiating/switching/swapping to the boETA product in the same period. We obtained baseline demographics and clinical data for all patients. Therapy persistence in bsETA versus boETA initiators was compared using Kaplan-Meier methods and adjusted hazard ratios (HR). Our hazard models adjusted for age, sex, disease duration, methotrexate (MTX) dose at baseline, and comorbidities (Charlson comorbidity index).

Results: We studied 48 patients initiating bsETA (including 37 etanercept-naïve patients) and 59 patients initiating boETA. Sex distribution, age, comorbidities and disease duration (at etanercept initiation) were similar between groups. Use of MTX and/or other conventional synthetic DMARD at etanercept initiation was also similar between groups; however, patients in the boETA group started with a significantly higher dose of MTX (22.0 ± 3.5mg) when compared to bsETA users (19.0 ± 5.2mg, p = 0.011). Persistence on therapy was similar in both groups: after 12 months, 75% of originator etanercept versus 84% of biosimilar etanercept initiators remained on their initial treatment. Adjusting for baseline age, sex, disease duration, methotrexate dose at baseline, and comorbidities, the adjusted HR for therapy persistence in biosimilar etanercept versus originator etanercept group was 2.05 (95% CI 0.83, 5.04).

Conclusion: Patients initiating bsETA or boETA were similar in terms of age, disease duration, disease activity, and comorbidities. We were unable to identify clear differences in treatment persistence between the two groups; a strong trend for greater persistence with biosimilar versusoriginator may be related to residual confounding (e.g.: disease activity). Further work is ongoing to study outcomes in a larger, multicentre group of patients.

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Profile of Renal Function in Patients Suffering From Rheumatoid Arthritis

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Objectives: Many medications used in the treatment of rheumatoid arthritis (RA) impact renal function. A glomerular filtration rate (GFR) cut-off point of 60 mL/min/1.73 m2 is often mentioned for dose adjustment or contraindication. We evaluate the proportion of patients with impaired renal function at the moment of initiation of RA treatment.

Methods: The data of patients affected by RA starting a csDMARD, biological original, biosimilar or targeted synthetic (ts) DMARD were extracted from the Rhumadata® registry. For those patients, the estimated GFR (eGFR) was assessed using the CKD-EPI equation and the MDRD formula. eGFR are presented in five years age groups for both men and women. The proportion of patients with an impaired renal function (IRF) (i.e. an eGFR below 60 ml/min/1.73 m2) is also presented. Potential predictors of IRF are explored.

Results: Overall eGFR was obtained for 609 men and 1853 women. In men, mean eGFR in the 25-29, 55-59 and 75-79-years age groups are 125 ± 10, 92 ± 15 and 69 ± 16 ml/min/1.73 m2. In women, these estimates are 115 ± 14, 87 ± 16 and 70 ± 17 ml/min/1.73 m2. No patients below 45 years of age has an IRF. After this age, the proportion of men with an IRF increases from 5.1% in the 45-49-years age group to 21.2% in the 75-79-years age group. In women, these same proportions are 2.3 and 24.2%. The results of a stepwise forward selection logistic regression predicting IRF retained age at diagnosis (OR and 95% confidence interval = 1.093 (1.073, 1.112)), gender ((women vs. men) 1.929 (1.278, 2.913)), disease duration (1.111 (1.087,1.136)) and hypertension (3.271 (2.116, 5.056)). The CKD-EPI equation and the MDRD formula identically classified 99% of patients as having (6%) or not having (93.0%) IRF. Thirty-four men (5.6%) and 128 women (6.9%) were classified as having IRF using the CKD-EPI equation. The MDRD formula classified 27 (4.4%) men and 130 women (7.0%) as having IRF. These differences were not statistically significant. eGFR in this RA population was similar non-diseased Caucasian males and females of the Nijmegen Biomedical Study for all aged groups.

Conclusion: As expected, eGFR decreases with age in women and men in a manner similar to that reported in the general population. Patients in all age groups after 45 years old may have an eGFR inferior to 60 ml/min/1.73 m2. Below 55 years old, less than 5% of our population has less than 60 ml/min/1.73 m2 of GFR as measure by CKD-EPI equation.

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Mapping Real-World Rheumatoid Arthritis Patients to Clinical Trial Eligibility Criteria

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Objectives: Results of real-world studies may be extrapolated to overall patient populations, whereas clinical trials outcomes can be limited in generalizability due to stringent eligibility criteria. This analysis sought to assess the proportion of rheumatoid arthritis (RA) patients treated with golimumab in Canadian routine care qualifying for a pivotal randomized controlled trial (RCT) and explore potential differences in outcomes.

Methods: This is a post-hoc analysis of data from the Biologic Treatment Registry Across Canada (BioTRAC). Patients with RA initiating treatment with subcutaneous golimumab were categorized as "Eligible" or "Non-Eligible" based on inclusion/exclusion criteria of the GO-FORWARD RCT. Reasons for non-eligibility and between-group differences in baseline characteristics, were assessed with univariate statistics. Treatment retention was compared using the log rank test. Safety was evaluated through incidence of adverse events (AEs).

Results: 410 patients were included: 31 (7.6%) were considered Eligible and 379 (92.4%) were considered Non-Eligible for GO-FORWARD. Among Non-Eligible patients, baseline inclusion criteria violated were: methotrexate dose outside ≥ 15 - ≤ 25mg/week (n = 163/379; 43.0%); patients not meeting 2/3 of 1) CRP ≥1.5 mg/dL or ESR ≥ 28mm/h, 2) ≥ 30 minutes of morning stiffness, 3) Anti-CCP or RF positive (n = 160/379; 42.2%); and non-active RA (< 3 SJC and < 2 TJC: n = 93/379; 24.5%). The primary exclusionary factor was baseline DMARD(s) use other than methotrexate (n = 243/379; 64.1%). Mean age, disease duration and gender were comparable (p > 0.05) across eligibility status. Significantly greater baseline disease activity was observed in Eligible vs. Non-Eligible patients for mean [SD] DAS28-ESR (5.7 [1.2] vs. 5.1 [1.4]) and DAS28-CRP (5.4

[0.9] vs. 4.8 [1.3]); TJC (11.8 [6.7] vs. 9.4 [6.9]) and SDAI (37.0 [13.7] vs. 30.9 [15.3]) were higher for Eligible patients, and approached significance (p < 0.065). Median [SE] treatment retention, although longer in Eligible patients, was not significantly different (Eligible vs. Non-Eligible: 4.0 [1.2] vs. 2.7 [0.2]) years; p = 0.243). ≥ 1 AE was reported for 67.7% (n = 21/31) of Eligible and 69.1% (n = 262/379) of Non-Eligible patients with lower incidence of serious infections in the latter.

Conclusion: The vast majority of RA patients treated with golimumab in Canadian routine care would not have been eligible for GO-FORWARD. Non-eligibility was driven primarily by deviations in baseline methotrexate use and/or dose. Requirements concerning laboratory parameters and minimum joint involvement resulted in an Eligible population with higher baseline disease activity. No differences were observed between patient subgroups in terms of real-word treatment retention or safety.

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Efficacy and Safety of Filgotinib for Patients with Rheumatoid Arthritis with Inadequate Response to Methotrexate: FINCH 1 Primary Outcome Results

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Objectives: To evaluate efficacy and safety of filgotinib (FIL), an oral, selective, Janus kinase-1 inhibitor which has shown good efficacy and tolerability for the treatment of rheumatoid arthritis (RA), in patients with RA with an inadequate response to methotrexate (MTX).

Methods: This phase 3, double-blind, active- and placebo (PBO)-controlled study (NCT02889796) randomized patients with active RA (3:3:2:3) to FIL 200mg, FIL 100mg or PBO daily, or adalimumab (ADA) 40mg every 2 weeks, for up to 52 weeks; results through Week 24 are presented. Patients also received background MTX. The primary endpoint was the proportion of patients achieving ACR20 response at Week 12. Safety endpoints included adverse event (AE) types/rates.

Results: Overall, 1,755 patients received study drug (FIL 200 mg, n = 475; FIL 100 mg, n = 480; ADA, n = 325; PBO, n = 475). Mean (standard deviation [SD]) duration of RA was 7.8 (7.6) years and mean (SD) DAS28-CRP was 5.7 (0.9). At Week 12, ACR20 response was achieved by 76.6%, 69.8%, 70.8%, and 49.9% of patients in the FIL 200mg, FIL 100mg, ADA, and PBO groups, respectively; p < 0.001 for both FIL groups vs PBO. The proportion of patients achieving ACR50/70 response was also significantly greater for both doses of FIL vs PBO at Week 12 (p < 0.001). At Week 24, more patients receiving FIL 200mg and 100mg achieved ACR20/50/70 response compared with PBO. At Week 12, DAS28-CRP ≤ 3.2 was achieved by 49.7%, 38.8%, 43.4%, and 23.4% of patients in the FIL 200mg, FIL 100 mg, ADA, and PBO groups, respectively. DAS28-CRP < 2.6 was achieved by 33.9%, 23.8%, 23.7%, and 9.3%, respectively; p < 0.001 for both FIL groups vs PBO for both DAS28-CRP endpoints. Non-inferiority of FIL 200mg to ADA was met based on DAS28-CRP ≤ 3.2. Superiority of FIL 200 mg and non-inferiority of FIL 100 mg to ADA was met based on DAS28-CRP < 2.6 (nominal). At Week 24, mean mTSS change from baseline was 0.13, 0.17, 0.16, and 0.38 for patients in the FIL 200 mg, FIL 100 mg, ADA, and PBO groups, respectively; p < 0.001 for both FIL groups vs PBO. Serious AEs occurred in 4.4%, 5.0%, 4.3%, and 4.2% of patients in the FIL 200 mg, FIL 100 mg, ADA, and PBO groups, respectively. The FIL safety profile was consistent with prior studies through Week 24.

Conclusion: FIL 200 mg and 100 mg led to significant improvement in RA signs and symptoms, prevented radiographic progression, improved physical function compared with PBO, and was well tolerated. FIL 200mg efficacy was non-inferior to ADA based on DAS28-CRP ≤ 3.2.

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Pooled Safety Analyses from Phase 3 Studies of Filgotinib in Patients with Rheumatoid Arthritis

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Objectives: Filgotinib (FIL) is an orally administered, selective Janus Kinase 1 inhibitor in development for the treatment of RA and other inflammatory diseases. The safety and efficacy of FIL was evaluated in three Phase 3, randomized, multicenter studies in patients with moderate to severely active RA, who had an inadequate response to MTX (FINCH 1; NCT02889796); who were receiving conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) and had an inadequate response to biological therapies (FINCH 2; NCT02873936); or who were MTX naïve and initiating MTX or FIL as a monotherapy or in combination (FINCH 3; NCT02886728). Here we present pooled safety data from the double-blind, active and placebo-controlled periods of FINCH 1–3 up to 24 weeks.

Methods: Enrolment into the FINCH studies required a diagnosis of RA (2010 ACR/EULAR criteria), ≥ 6 swollen joints, and ≥ 6 tender joints at screening and Day 1. Patients who received ≥ 1 dose of study drug were included in the safety analyses. Patients in FINCH 1 and 2 who did not achieve ≥ 20% improvement in both swollen and tender joint counts by Week 14 discontinued study drug and switched to standard of care. Week 24 safety data from the FINCH 1, 2, and 3 studies were aggregated and summarized by the number and percentage of patients with events or abnormalities for categorical values. Key safety endpoints were treatment-emergent adverse events (TEAE), serious TEAEs, TEAEs of interest, all death and treatment-emergent laboratory abnormalities.

Results: This pooled safety analyses assessed 3,452 patients across FINCH 1–3 (2,088 patients received FIL). At Week 24, the frequency of TEAEs and laboratory abnormalities were similar between patients in the FIL, placebo and active control arms of the FINCH studies. Laboratory abnormalities were mostly Grade 1–2. The proportion of patients with TEAEs of interest were similar across groups and the most common TEAEs were infections (notably upper respiratory tract and nasopharyngitis). Incidences of major adverse cardiac events (MACE), herpes zoster virus (HZV), deep vein thrombosis (DVT) and pulmonary embolism (PE) were low, and similar across groups (MACE: 0.2% FIL, 0.3% adalimumab, 0.5% placebo; HZV: 0.6% FIL, 0.6% adalimumab, 0.4% placebo; DVT/PE: < 0.1% FIL, 0% adalimumab, 0.3% placebo).

Conclusion: Pooled data from this large safety database highlights the favorable safety and tolerability profile of FIL in patients with RA both as a monotherapy and in conjunction with MTX/csDMARDs.

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Use of Simulation in Knee Joint Arthrocentesis among Internal Medicine Residents at Memorial University of Newfoundland to Develop Confidence and Initiate Program Improvement

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Objectives: 1. To determine current internal medicine residents' level of experience and comfort with arthrocentesis as a program needs assessment. 2. To begin development of a curricular program change with implementation of future program assessment evaluation tools.

Methods: A new simulation station focusing on knee arthrocentesis for Internal Medicine residents was developed and instituted piloted in the Fall of 2018 for introduction of the procedure for PGY1 and PGY2 residents and as a formative evaluation assessment tool for PGY3 residents in preparation for their Royal College examinations. Evaluations were collected after residents completed their simulation sessions as a means of program improvement for this particular simulation station as well as overall Internal Medicine program improvement. This assessment will look at residents' opportunities for arthrocentesis, level of comfort with arthrocentesis and their perception of the effectiveness of this station in developing their confidence. It will take place in St. John's, Newfoundland and Labrador, within the Faculty of Medicine at Memorial University of Newfoundland. The subjects will include internal medicine residents in postgraduate years one through three, their participation in the simulation session was mandatory, however, their feedback about the session was voluntary, and their non-participation did not negatively impact their training in any way. There are no exclusion criteria.

Results: Our preliminary data confirms that Residents have limited opportunities to perform arthrocentesis during their internal medicine training at Memorial University of Newfoundland. As a result they do not have the opportunity to become proficient in this skill nor are they capable of developing confidence in this procedure. Post pilot workshop confidence was improved. And suggestions were collected to further improve program effectiveness.

Conclusion: Internal medicine residents must develop proficiency in joint arthrocentesis during their training but are not currently effectively and reliably able to develop this skill at Memorial University of Newfoundland. Simulation sessions using a knee joint model along with the provision of learning resources are useful tools in residents' development of proficiency and confidence in performing knee arthrocentesis.

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It's Doable! Use of an Objective Structured Clinical Examination for Faculty and Resident Development in Adapting to Competency Based Medical Education

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Objectives: Rheumatology training programs across Canada transitioned to competency based medical education (CBME) in July 2019. Entrustable Professional Activities (EPAs) and milestones require new assessment strategies which are largely unfamiliar to residents and faculty. This study assessed the use of the Objective Structured Clinical Exam (OSCE) as a training tool to introduce new aspects of CBME to both residents and faculty.

Methods: New rheumatology trainees attended an annual course in Vancouver, intended to equip them with basic skills and knowledge to function as a rheumatology resident. We designed an OSCE administered at the course which incorporated the new entrustment scales for assessment of EPAs. We assessed difference in perceptions among residents and faculty on comfort with CBME pre - and post- OSCE.

Results: Resident (n = 20) perceptions on comfort in training in a CBME model increased following the OSCE in a statistically significant manner (p = 0.03). There was a trend in faculty (n = 9) perceptions on increased comfort with CBME post-OSCE, although it did not reach statistical significance. Qualitative feedback from residents emphasized the value of the OSCE for reinforcing clinical skills over CBME understanding. Faculty feedback placed value on having a scheduled opportunity to get guided practice with a new model of medical education.

Conclusion: The OSCE can be a valuable tool for both resident and faculty development. This study used OSCE to provide residents and faculty with an opportunity to gain familiarity with new aspects of CBME. Faculty appeared to strongly value a scheduled, guided and structured opportunity to practice using entrustment scales.

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Addressing Educational Needs Around Pregnancy and Reproductive Health in Women with Rheumatic Disease

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Objectives: This study aims to identify whether patient knowledge gaps around pregnancy and rheumatic disease are being addressed, and how to improve the delivery of patient education and care.

Methods: Questionnaire responses were collected from 43 women patients at the University of Alberta Rheumatology clinic between the ages of 18 to 45 years. Participants were diagnosed with a rheumatic condition before pregnancy and either pregnant within the last 5 years, currently pregnant, or planning pregnancy in the next 2 years. Questionnaire items were generated based on previous published literature, and results analyzed applying descriptive statistics. The questionnaire was distributed and managed using REDCap software.

Results: Among 12 topics previously identified as important educational needs when considering rheumatic disease and pregnancy, 4 topics were discussed most frequently between patients and their rheumatologist: medication safety during pregnancy, medication safety while breastfeeding, managing rheumatic condition during pregnancy, and risks to mother/baby during pregnancy. Most women felt their educational needs were addressed, yet 25.6% (11/43) of patients did not discuss any of these 12 important topics with their provider. 57.1% of participants found additional information on their own, mostly from online resources (63.9%). The majority of participants (90.7%) prefer to receive educational information from their rheumatologist.

Conclusion: There is variation in delivery of patient education around pregnancy and rheumatic disease. Patients indicate they prefer to receive information from their rheumatologist and to use online resources when finding information on their own. Combining these forms of patient education will be important when considering how to improve the delivery of education and care around pregnancy and reproductive health concerns in women with rheumatic disease.

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Obesity Management and Smoking Cessation in Rheumatoid Arthritis: Perceptions of Rheumatology Health Care Providers in British Columbia

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Objectives: To assess rheumatology health care providers' (HCPs) knowledge, beliefs, self-efficacy, and perceived barriers pertaining to overweight/ obesity management and tobacco use/smoking counselling.

Methods: We performed a cross-sectional study, using online surveys to collect data on: 1. Rheumatology HCPs' knowledge of the impact of obesity and cigarette smoking on rheumatoid arthritis (RA) outcomes; 2. Providers' beliefs on obesity and cigarette smoking in their patients with RA; 3. Providers' self-efficacy at addressing weight and smoking; and 4. Providers' perceived barriers when counselling on weight management and smoking cessation. Members of the British Columbia (BC) Society of Rheumatologists and the Association of Rheumatology Nurses in BC were invited to participate through an email from their respective associations explaining the study and containing an anonymous survey link. Descriptive statistics were used to describe answers to the survey.

Results: Twenty-nine rheumatology HCPs (19 rheumatologists, 10 nurses)

completed the survey (response rate: 21%). Twenty-two were female (76%) and none actively smoked. All participants described their obesity- and smoking-related training during medical/nursing school or residency as poor or fair. Specifically, 21/29 (72%) endorsed poor training in obesity care and weight loss counselling. The vast majority of participants correctly identified the associations between obesity, or smoking, and higher RA activity or severity (90%), as well as poorer responsiveness to treatment (90% for obesity and 93% for smoking). All but one participant agreed that it was their responsibility to discuss achieving or maintaining a healthy weight and quitting smoking (if relevant) with their patients. Perceived self-efficacy in helping patients quit smoking or achieve clinically significant weight loss, however, was low: 21/29 (72%) and 20/29 (69%) felt slightly or not at all confident in facilitating smoking cessation and weight loss, respectively. Most common barriers to addressing overweight/obesity and smoking were: lack of time, more important issues to discuss, lack of training in obesity management or smoking cessation, lack of access to expertise, and lack of knowledge of programs available to patients.

Conclusion: Rheumatology health care providers in British Columbia understand the negative implications of obesity and smoking in rheumatoid arthritis and accept responsibility in discussing these issues. However, they describe lacking the training and confidence to do so effectively. Opportunities exist to bridge this gap. A toolkit or handout outlining accessible resources and local expertise, along with simplified strategies to sensitively initiate weight- and smoking-related conversations, may address commonly reported barriers and help providers connect patients with community supports.

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Occam's Razor Vs. Hickam's Dictum: An Atypical Case of MPO+ ANCA-associated Vasculitis

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Background: While rare, ANCA-associated vasculitides (AAVs) represent the most common cause of new-onset glomerulonephritis in adults over 50. Prompt recognition and early treatment are critical for preservation of renal health. Because of the various clinical manifestations and often unpredictable disease courses, clinicians may fall victim to cognitive traps such as anchoring, premature closure, and search satisfaction, misdiagnosing AAV as more common conditions. An awareness of these cognitive biases may help clinicians catch these "disguised" cases of AAV.

Case Presentation: This case report describes an 83-year-old female who was seen for persistent fatigue, cough, and subjective weakness. She was found to have anemia, elevated ferritin, C-reactive protein (CRP), and platelets. Infectious causes were ruled out. A temporal artery biopsy was arranged for the work-up of persistent CRP elevation. The biopsy was consistent with temporal arteritis and the patient was treated with prednisone. Autoimmune workup also revealed anti-SSA/Ro and anti-myeloperoxidase (MPO) positivity despite no typical symptoms suggestive of small vessel vasculitis or Sjogren's syndrome. One month after completing her prednisone taper, she experienced a recurrence of weakness, with dry eyes and mouth and dry cough. This raised suspicion for Sjogren's syndrome. A salivary biopsy revealed non-specific chronic sialadenitis. A chest CT showed calcified mediastinal lymphadenopathy plus non-specific interstitial pneumonitis (NSIP). Sarcoidosis became the working diagnosis. Three years later, she presented with acute kidney injury, proteinuria, and hematuria. Renal biopsy revealed pauci-immune glomerulonephritis. She was diagnosed with MPO+ AAV and treated with glucocorticoids and cyclophosphamide. Her symptoms have since resolved but her renal function is slow to improve. She is now on a prednisone taper and azathioprine.

Conclusion: To our knowledge, this is the first published case where temporal arteritis, lymphocytic sialadenitis, pauci-immune glomerulonephritis, NSIP, and mediastinal lymphadenopathy are all present. In light of the available evidence, we hypothesize that this is an atypical case of MPO+ AAV rather than an overlap between multiple autoimmune conditions. This illustrates a common conundrum in medicine: Occam's razor vs. Hickam's dictum. How do we balance searching for a unifying diagnosis vs. accepting the possibility that multiple diagnoses may co-exist? It is important to consider rheumatologic overlap syndromes and accept diagnostic uncertainty when encountering atypical presentations to avoid anchoring, premature closure, and search satisfaction. Furthermore, one must interpret diagnostic tests in the context of the patient's presentation: a positive temporal artery biopsy, for example, does not always signify giant cell arteritis.

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Care Gaps in Cervical Cancer Screening in Patients With Systemic Lupus Erythematosus

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Objectives: Patients with systemic lupus erythematosus (SLE) have an increased risk of cervical cancer compared to the general population. The 2018 Canadian Rheumatology Association (CRA) SLE guidelines released a conditional recommendation that women with SLE should undergo a yearly Papanicolaou (Pap) test for cervical cancer screening. However primary care providers may not be aware of the malignancy risk in SLE. The objectives of this study were to determine if rheumatologists routinely document cervical cancer screening recommendations for SLE patients, and to assess the effectiveness of educational posters in the rheumatology clinic on improving communication about the importance of Pap screening to patients' primary care providers.

Methods: This quality improvement initiative took place at the Rheumatology clinic at St. Joseph's Health Care London, Ontario. Rheumatology clinic notes of SLE patients seen from July 1, 2018 to July 1, 2019 (baseline visit) were reviewed for inclusion of cervical cancer screening status and recommendations. Our first Plan-Do-Study-Act (PDSA) cycle started in July 2019 and consisted of the placement of educational posters outlining the CRA's current Pap screening recommendations in staff and trainee work areas. Trainees were further informed about the initiative during rotation orientation. Medical records were then reviewed 3 months later to see if the initiative led to an increased number of rheumatology clinic reports addressing cervical cancer screening.

Results: The medical records of 224 female SLE patients were examined at baseline. There were 5 cases of pre-existing cervical lesions (either high grade dysplasia or cancerous) documented at baseline. Based on current Canadian Task Force screening guidelines, 165 of the 224 (74%) females qualified for Pap screening. None of the clinic notes of these 165 patients reported Pap screening at baseline. Three months after the placement of the cervical cancer screening information posters, 53 of the original 165 patients had been seen in follow-up, and 4 (8%) had clinic notes that documented Pap screening information.

Conclusion: Patients with SLE have an increased risk of cervical cancer; however, this association is underrecognized by health care providers. Despite visual reminders in the clinic setting, rheumatologists did not routinely document the importance of Pap screening in SLE patients. Future educational initiatives will be employed to improve communication of health surveillance recommendations to primary care providers.

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Barriers to Musculoskeletal Ultrasound Training Among Rheumatology Residents at the University of Toronto

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Objectives: A Musculoskeletal ultrasound teaching curriculum for Rheumatology residents at the University of Toronto was introduced in 2016 in the form of 4 academic half-days, combining anatomy with ultrasound (US). The current study aimed to evaluate the current curriculum and understand the barriers to musculoskeletal US training in our program.

Methods: In June 2019, a survey was delivered to the residents through Survey Monkey and on paper at an academic half-day after ethics approval. The questions assessed effectiveness of the current teaching, the main obstacles to gaining further US exposure, and whether residents were interested in improving their US skills. They were further asked how they would use US in practice and how training could be further improved.

Results: 10/12 adult and 4/6 pediatric rheumatology residents participated in the survey. All except one reported they found the current training useful but only 50% had managed to get further exposure to US after the training sessions. Lack of access to US machines (6/14), lack of supervision (3/14) and busy clinics (3/14) were quoted as reasons for lack of exposure. All except one resident were interested in gaining further exposure, with 12/14 being keen on doing a further US course. All except one resident reported they would use US to detect synovitis. Other reasons for using US included detecting tenosynovitis, tendon tears, disease monitoring and for guiding joint aspiration or injection. Repeated exposure to US through access in daily clinics under supervision by trained staff, running dedicated US clinics and an US rotation were suggested as ways to improve training. Pediatric residents suggested exposure to pediatric cases would be more helpful.

Conclusion: Although the value of musculoskeletal US is appreciated by Rheumatology residents, continued exposure to US remains a challenge. Access to US machines and trained staff to supervise were key barriers to musculoskeletal US training among rheumatology residents at the University of Toronto.

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ECHO Ontario Rheumatology: Program Outcomes After Three Years
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Objectives: ECHO Ontario Rheumatology ("Rheum ECHO") was first proposed to address the increasing burden of rheumatoid arthritis (RA) in Ontario. RA is a common, chronic, and complex disease that affects 1% of the population in Ontario, with a higher prevalence in First Nations populations at 3%. Timely and aggressive treatment of RA with disease-modifying anti-rheumatic drugs (DMARDs) can lead to effective management of symptoms. Left untreated, however, RA can lead to deformed joints, debilitating pain, and significantly reduced quality of life. Despite the increasing prevalence of RA, the number of rheumatologists to manage these patients remains the same. What evolved, however, was a program that addressed all rheumatologic diseases including – but not exclusively – RA, reflecting a shift from the original proposal to meet the needs of the communities served. Rheum ECHO began running weekly sessions in January 2017. This study describes the program outcomes and quality improvement (QI) initiatives of Rheum ECHO.

Methods: A mixed methods study with a QI lens was used to examine program outcomes of Rheum ECHO. Pre-post questionnaires were administered to healthcare providers (HCPs) who attended ECHO using an online survey platform, and a focus group was conducted. Patient cases were summarized using the data extracted from HCPs' weekly case presentation forms. QI opportunities were also identified from provider- and patient-level data.

Results: Rheum ECHO increased HCPs' self-efficacy and knowledge. Overall, HCPs were extremely satisfied with the program. From the focus group discussion, HCPs discussed their experiences participating in Rheum ECHO, the impact on practices in rural and remote Northern Ontario, and the impact on their clinical skills. At baseline, patients presented in Rheum ECHO needed clarification on diagnosis, treatment, and medical management. After their presentation at ECHO, patients received recommendations on diagnoses, referrals, investigations, and pharmacological and non-pharmacological (psychosocial and manual therapies) management. Some patients received a faster time to diagnosis and referral to appropriate care.

Conclusion: Outcomes after our third year of ECHO Ontario Rheumatology demonstrate a positive impact on HCPs, especially those practicing in rural and remote communities in Northern Ontario. Future research will report follow-up from patient cases presented at ECHO and outcomes of QI initiatives.

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Exploring Heterogeneity in Rheumatoid Arthritis: Patient Profiling through Principal Component and Cluster Analysis of The BRASS Registry
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Objectives: Data-driven principal component (PC) and cluster analysis has the potential to identify previously unrecognized patient subgroups to establish prognosis, predict disease trajectory, and help inform treatment. The Brigham and Women's Rheumatoid Arthritis Sequential Study (BRASS) is a single-center, prospective observational registry cohort providing a comprehensive set of clinical disease activity measures in >1400 patients with RA. We used PC and cluster analysis of baseline demographic, socio-economic, health and disease characteristics in BRASS to identify and characterize distinct patient clusters in RA.

Methods: Patient variables recorded at entry into BRASS were refined and combined using PC analysis to reduce dimensionality and collinearity. The number of PCs was established by eigenvalue >1, cumulative variance, and interpretability. Patients were clustered using a k-means approach with non-hierarchical, exclusive, and complete clustering, with minimum cluster size 5% of population. The final number of clusters was determined according to the cubic clustering criterion and pseudo F.

Results: Analysis of baseline data from 1443 patients identified 41 PCs; cluster analysis distinguished 5 patient clusters. Each cluster reflected a different profile of PCs, which can be described based on general health, RA disease activity and duration: "health high, RA controlled, shorter RA duration" (Cluster 1; N = 691); "health high, RA controlled, longer RA duration" (Cluster 2; N = 280); "health low–moderate, moderate RA, moderate RA duration" (Cluster 3; N = 174); "health low, RA uncontrolled, shorter RA duration" (Cluster 4; N = 108) and "health low, RA uncontrolled, longer RA duration" (Cluster 5; n = 190). Key differentiators between clusters include comorbidity PCs (neurologic comorbidities predominate in cluster 3, metabolic in cluster 4, and orthopedic in cluster 5) and patient characteristics/social PCs (highest/lowest income in clusters 1/5 respectively, greatest number of doctor visits and family history of MI in cluster 2, greatest BMI and least emotional support in cluster 4).

Conclusion: Data-driven cluster analysis of RA patient characteristics at entry into the BRASS registry identified five distinct patient phenotypes, providing a convenient method to potentially derive novel insights into the multifactorial drivers, commonly co-occurring health conditions, and manifestations of RA. Investigation of longitudinal outcomes in these clusters in the BRASS registry and validation in an independent dataset is ongoing. DISCLOSURES: Analyses presented here and medical writing support (Matt Lewis, Adelphi Communications Ltd) were funded by Sanofi and Regeneron Pharmaceuticals, Inc in accordance with Good Publication Practice (GPP3) guidelines. Abstract previously presented at the 2019 European Congress of Rheumatology; 12–15 June; Madrid, Spain.

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Exploring Heterogeneity in Rheumatoid Arthritis: Outcomes up to 4 Years of Follow-Up in Patient Clusters Identified by Data-driven Analysis of The BRASS Registry

Jeffrey Curtis (University of Alabama at Birmingham, Birmingham); Michael Weinblatt (Brigham and Women's Hospital, Boston); Kenneth Saag (University of Alabama, Birmingham); Vivian Bykerk (Hospital for Special Surgery, New York); Christina Charles-Schoeman (University of California, Los Angeles); Stefano Fiore (Sanofi, Bridgewater); Gregory St John (Regeneron Pharmaceuticals, Inc, Tarrytown); Toshio Kimura (Regeneron Pharmaceuticals, Inc., Tarrytown); Shen Zheng (Sanofi, Bridgewater); Clifton Bingham (Johns Hopkins University, Baltimore); Grace Wright (New York); Martin Bergman (Drexel University College of Medicine, Philadelphia); Kamala Nola (Lipscomb University College of Pharmacy & Health Sciences, Nashville); Daniel Furst (University of California, Los Angeles); Nancy Shadick (Brigham and Women's Hospital, Boston)

Objectives: Patients with rheumatoid arthritis (RA) may share characteristics that relate to their future outcomes. We investigated clinical outcomes over a 4-year follow-up period in objectively identified RA patient clusters, derived empirically via a data-driven approach using The Brigham and Women's Rheumatoid Arthritis Sequential Study (BRASS) registry.

Methods: Patient clusters were identified by principal components (PC) and cluster analysis of demographic, socio-economic, health and disease characteristics using patient data collected at entry (baseline) into BRASS. Patients in BRASS are followed in the clinic at least annually and are sent questionnaires at 6-month intervals. Mean scores of clinical measures were observed at 12- and 24-months of follow-up including Clinical Disease Activity Index (CDAI), Disease Activity Score 28-joint count C-reactive protein (DAS28-CRP), BRASS self-administered Rheumatoid Arthritis Disease Activity Index (RADAI), swollen and tender joint count (SJC and TJC), Multidimensional Health Assessment Questionnaire (MDHAQ), and Functional Status Mental Health Index (FSMHI). Time to first infection and to first RA medication change over 4 years were analysed via Kaplan-Meier curves.

Results: PC analysis of variables among 1443 patients recorded at entry into BRASS identified 41 PCs which informed the identification of 5 novel patient clusters. Cluster 1 patients ("general health high, RA controlled, shorter RA duration" [N = 691]) remained free of infection longer than other clusters. Cluster 2 patients ("general health high, RA controlled, longer RA duration" [N = 280]) sustained the lowest SJC throughout follow-up. Cluster 3 patients ("general health low–moderate, moderate RA control, moderate RA duration" [N = 174]) exhibited the greatest improvement in mental health (FSMHI). Cluster 4 patients ("general health low, RA uncontrolled, shorter RA duration" [N = 108]) exhibited the greatest reduction in TJC. Cluster 5 patients ("general health low, RA uncontrolled, longer RA duration" [N = 190]) exhibited the highest CDAI scores throughout follow-up and the highest persistence with baseline therapies.

Conclusion: Five patient clusters, identified by data-driven PC analysis of the BRASS registry exhibited distinct patterns of clinical outcomes and management over 4 years. These data suggest the clusters represent clinically meaningful profiles of RA and illustrate the potential of data-driven patient profiling to support personalized medicine in RA. Validation in an independent dataset is ongoing. DISCLOSURES: Analyses presented here and medical writing support (Matt Lewis, Adelphi Communications Ltd) were funded by Sanofi and Regeneron Pharmaceuticals, Inc in accordance with Good Publication Practice (GPP3) guidelines. Abstract previously presented at the 2019 European Congress of Rheumatology; 12–15 June; Madrid, Spain.

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Decomposition Analysis of Spending and Price Trends for Biologic Disease-Modifying Anti-Rheumatic Drugs by Public Payers in Canada and the United States

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Objectives: Biologics (bDMARDs) are among the highest-spend drugs in Canada and USA, and spending keeps rising. We characterized changes in total spending and unit-prices for bDMARDs in Canadian and US public drug programs and quantified the major sources of spending increases in each setting.

Methods: We accessed aggregated drug spending data from British Columbia (BC = Canada's third-largest province) and USA for years 2012-2017. BC data included all bDMARD claims accepted by Pharmacare, BC's public drug program, for public reimbursement or towards patients' deductibles (~79% of bDMARD sales in BC). US data included bDMARD claims for all > 42 million Medicare Part B (fee-for-service), Part D, and Medicaid enrollees. bDMARDs covered by Pharmacare and Medicare/Medicaid for ≥ 1 rheumatic disease through December 2015 were eligible. For each bDMARD and calendar-year we extracted total spending, and numbers of recipients, claims, and doses dispensed, and calculated drug unit-price (average cost/dose). Analysis: We calculated six-year changes in total spending and unit-prices for each bDMARD, adjusting for general inflation to 2017$. We then performed standard decomposition analyses to isolate the contributions of four sources of spending growth (drug prices, recipient numbers, treatment intensity [# doses/claim], and annual # claims/recipient) for each bDMARD and in-aggregate. For BC, we examined total spending (publicly-reimbursed and patient-paid components) and publicly-reimbursed spending alone. For USA we included statutory Medicaid rebates, and both excluded and included time-varying Medicare rebates (range 20-30%).

Results: Eight bDMARDs met inclusion criteria. From 2012 to 2017 combined public-payer and patient bDMARD spending increased by 54% in BC (from $185 million to $284 million CDN); publicly reimbursed component increased by 64% ($131 to $215 million). US spending nearly doubled: $5.6 to $11.1 billion USD. BC and USA had similar utilization patterns and trends: oldest bDMARDs (e.g., adalimumab, infliximab, etanercept) incurred the greatest spending in both settings, and adalimumab, certolizumab, and golimumab had the largest increases in recipients. In BC, vast majority (87%) of bDMARD spending growth was from increased numbers of recipients; unit-price increases accounted for just 1.7%. Conversely, price hikes accounted for 63% of US public-payer spending growth (59% with time-varying rebates); median six-year bDMARD price increase in Medicare/Medicaid was 59% (post-rebate price increase = 41%).

Conclusion: Individual- and pan-Canadian negotiations with drug manufacturers likely helped BC (and other provinces) avoid the steep post-market price hikes faced by US public-payers. However, further measures (i.e. expanded use of lower-priced biosimilars) are needed to help manage ongoing rises in public spending from increasing numbers of bDMARD recipients.

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Health-related Quality of Life During the Pre-conception and Gestational Periods in RA and SLE Women: A Systematic Review

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Objectives: Systemic autoimmune rheumatic diseases (SARDs) often affect women of childbearing age. Reproductive issues such as fertility, pregnancy, and parenthood can represent added stressors in women affected by SARDs, potentially affecting health-related quality of life (HRQoL). We performed a systematic review of HRQoL in rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) patients during the pre-conception and gestational periods.

Methods: We conducted a systematic review using the Embase (1947-08/2019), Ovid (1946-08/2019) and Web of Science (1900-08/2019) electronic databases. No language restrictions were applied. Search terms included (1) rheumatoid arthritis; (2) systemic lupus erythematosus; (3) quality of life or QoL or SF-36 or SF-12; (4) pregnancy or gestation or maternal. All terms within each set were combined using the Boolean operator "OR," and then each SARD was combined with the two other sets using "AND." Reference lists and meeting abstracts were also searched.

Results: Our literature search generated 318 articles and abstracts. Of these, 311 were excluded after review of the title/abstract for lack of relevance. Four articles and three abstracts were included in the final analysis. Three surveys of RA and SLE revealed that many patients express concern or anxiety regarding family planning, with some abandoning their pregnancy wishes or restricting their family size due to their illness. One prospective study reported that SLE patients unable to conceive have worse HRQoL scores on the RAND-36 than those achieving pregnancy and that pregnant RA patients have generally lower HRQoL than SLE patients. This same study and another using the AIMS2-SF noted that RA pregnant patients were more affected in the physical role and bodily pain than SLE patients. One conference abstract found that pain is the most important variable for patient-reported health assessment in pregnant SLE women. Regarding mental health, one suggested that pregnant RA patients have better social functioning and mental health than pregnant SLE patients, while another was unable to find statistical differences. Finally, one article and one other conference abstract showed that SARDs patients have worse overall HRQoL during pregnancy compared to those without a SARD.

Conclusion: Although studies are limited, our systematic literature review suggests that RA and SLE adversely affect the experience of becoming a mother, whether through physical limitations or psychological concerns. Further research is required to evaluate the HRQoL in RA or SLE during pre-conception and pregnancy. A better understanding of these reproductive issues will help identify strategies to improve maternal well-being in affected women.

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Salmonellosis in Systemic Lupus Erythematosus: A Literature Review of Reported Cases

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Objectives: Systemic lupus erythematosus (SLE) patients are at increased risk of infection, attributed to the use of immunosuppression and dysfunction of the innate immune system. Bacterial infections are frequent and can lead to increased morbidity and mortality in these patients. SLE is the most common underlying chronic disease associated with non-typhoid Salmonella infections. These infections can present with non-specific symptoms, masquerading as SLE flare, delaying antibiotic treatment. The aim of this study was to conduct a literature review of cases of Salmonella in SLE to examine the epidemiology, clinical presentation and morbidity associated with these infections. To date no comprehensive reviews related to this infection in SLE exist.

Methods: A literature search was carried out in OVID MEDLINE and EMBASE from 1947 to March 2019 using MeSH keywords; SLE, lupus, Salmonella, Salmonellosis. Searches were limited to English and French publications involving human subjects. Published case reports or case series of culture proven Salmonella in patients with SLE were reviewed. Articles were included if case description was detailed with the following documentation for extraction: age, gender, ethnicity, SLE diagnosis, SLE medications, clinical presentation, site of infection, culture results, treatment and outcomes. Full text review and data extraction was performed by two independent reviewers. Extracted data was summarized descriptively.

Results: We identified 335 articles in the initial search, of which 84 articles were included for final analysis. This represented 306 individual patient cases including 18 case series. Most cases were reported in females (86%) and the average age at infection was 31.8 years. The majority of cases were reported in Asia (40%), followed by Europe (23%), Americas (19%) and the Middle East (15%). Immunosuppressive therapy prior to infection, when reported, was most commonly corticosteroids 61.3% (prednisolone and prednisone), cyclophosphamide (14.2%), and azathioprine (14.2%). Only 5.6% of patients had no prior history of immunosuppressive therapy. The clinical presentations of Salmonella infections ranged from bacteremia (68.8%), MSK (37.9%), gastrointestinal (19.9%), urogynecology (18.4%), cardiopulmonary (5.2%), CNS (1.8%), and vascular/lymphatics (1.5%). Death resulting from Salmonella infection was reported in 38 cases (12.4%).

Conclusion: This review of published Salmonella cases in SLE provides insight into the epidemiology of these frequent infections and describes the atypical presentations in these susceptible patients. This report highlights the importance of excluding infection in SLE patients which often presents like an exacerbation of SLE but can contribute to significant morbidity and early mortality.

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The Budget Impact of a Biosimilar Transition Policy for Rheumatoid Arthritis Patients in Alberta

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Objectives: Biologic disease-modifying anti-rheumatic drugs (biologics) are effective but costly in managing moderate to severe rheumatoid arthritis (RA). Biologics account for 22% of annual Canadian public drug spending. Subsequent Entry Biologics ("biosimilars") cost approximately 60% of originator biologics. Clear policies regarding the use of biosimilars in Canada are lacking. Our objective was to estimate the public healthcare budget impact of transitioning to biosimilars for RA patients currently receiving two originator biologics (Enbrel and Remicaide) with biosimilars available (Brenzys and Inflectra).

Methods: We used longitudinal 2013-2018 data from the Calgary central rheumatology clinic covering 1/3 of Alberta's population to identify biologic coverage patterns in RA patients. A budget impact analysis (BIA) of transitioning to biosimilar for 2019-2023 in Alberta was conducted. The costs included the drug cost and infusion cost where applicable. The base case scenario assumed 50% of patients switch to biosimilars in year one, and remaining patients switch in following years. Three alternative scenarios with varying switching implementation rates and retention rates based on current Canadian and international recommendations were examined in sensitivity analysis.

Results: 1,654 unique Calgary RA patients were prescribed biologics between 2013-2018, and the number of RA patients prescribed biologics increased by 43%. The base case BIA found that switching to biosimilars could save $63.4 million between 2019-2023 in Alberta (of total $188 million estimated biologic spending). In sensitivity analysis, this ranges from a savings of $51.2 million (slow implementation) to $53.7 million (80% switching).

Conclusion: A transition policy to biosimilars could reduce healthcare system costs although the savings may not be as high as expected depending on the implementation policy and retention rates. Further analyses should include costs beyond the drug costs as well as patient outcomes.

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Co-designing an mhealth App for Patient and Physician Knee Osteoarthritis Management

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Objectives: To collaboratively develop a knee osteoarthritis (KoA) prototype mHealth app with patients, family physicians and researchers to facilitate guided, evidence-based self-management, support patient-physician communication, and address both patient and provider needs.

Methods: We took a qualitative approach to co-design using focus groups, prioritization activities, and a pre-post quality and satisfaction (Kano) survey. These activities were used to facilitate discovery and ranking of patient, physician and researcher perceptions of key prototype app functional requirements. Participants comprised family physicians, patient researchers and patients with KoA (including previous participants of related KoA collaborative research), researchers, key stakeholders, and industry partners. Our research was conducted at an academic centre in southern Alberta.

Results: We discovered that patients, physicians and researchers perceive differently, the importance, convenience, desirability, and/or actionability of KoA prototype functional requirements. Despite these differences in prioritization, and the emergence of differing rationale, even when priorities were similar, study participants were able to collaboratively prioritize functional requirements into three categories over the study period. High priority requirements comprised visual graph of symptoms; setting goals; planning exercises/daily tracking; self-management strategies, mid-range requirements comprised 7-year osteoporosis severity prediction; reminders; tracking pain symptoms, and the lowest priority functional requirements included tracking impairment/stiffness symptoms; use of flags to identify arthritis-impacted days. This negotiated process of functional requirement determination successfully informed the development of a prototype mHealth app for KoA management. A structured co-design process tailored to patients, physicians and researchers also revealed important collaborative components within the design process, including co-conceptualization, shared language power, rationale, and governance; equity; mutual learning and respect; a safe context to conduct open and transparent dialogue; the formulation of shared team operating principles (group reflection, negotiation and embracing differences and diversity); and explicit and continuous support for individual team members to challenge assumptions and question conventional thinking.

Conclusion: Preserving diverse perspectives among patients, physicians and researchers, while negotiating perceptions about the core functional requirements of a KoA management mHealth prototype app is possible. Deliberately involving multiple stakeholders throughout design phases supported high co-design interactivity and serviced achievement of our research objectives. Further work to validate these findings, and to describe and define variability in collaborative research components is indicated (e.g., terminology, fidelity, reporting, and better description of collaborative components in different collaborative approaches etc.). In particular, insights about how to assess, quantify and explain the influence of collaborative research processes, and the outcomes and impacts of collaborative research, are needed.

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Alignment of Care Delivery Patterns for Patients with Inflammatory Arthritis with the Pan-Canadian Approach to Inflammatory Arthritis Models of Care: A Qualitative Evaluation

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Objectives: The study represents the first, qualitative, phase of a national multi-phase mixed-methods research program aiming to build a business case for models of care (MoCs) for patients with Inflammatory Arthritis (IA) in Canada in order to facilitate their implementation and sustainability. The objective of this qualitative study was to describe patterns of care delivery for patients with IA across Canada and to assess their alignment with the Arthritis Alliance of Canada (AAC) Pan-Canadian Approach to (IA) MoCs (the AAC IA MoC).

Methods: Rheumatology clinics participating in the Canadian Early Arthritis Cohort (CATCH) study were invited to participate. To systematically describe care delivery across sites, the AAC IA MoC was used as a framework for the data collection and analysis. Data on patterns of care delivery were collected through an on-line survey and in-depth phone interviews with the key representatives from participating sites. Survey and interview data were narratively analyzed and grouped into the categories as per elements of the AAC IA MoC to identify key themes.

Results: Overall, 10 CATCH sites from 4 provinces (Alberta, Manitoba, Ontario and Quebec) participated. A total of 10 surveys and 17 interviews (22 participants) were conducted with 1 survey and 1 to 3 interviews completed per site. In the survey, a minority (n = 3) identified their site as having a defined MoC for patients with IA. In the interviews, most participants reported limited awareness of the AAC IA MoC. Nonetheless, all sites described having implemented or were attempting to implement many of the elements described in the AAC IA MoC. While a description of strategies for 'Medical Management' was fairly consistent across sites, strategies varied for the 'Access', 'Shared Care' and 'Patient Self-Management' elements. Most sites reported difficulties with implementing and sustaining strategies for 'Identification', 'Shared Care' and 'Performance Measurement' elements due to scarce resources(e.g., lack of funding to support clinic needs, clinic space, rheumatologists and other care providers) and other challenges (e.g., long waiting lists and delayed recognition of IA by primary care providers). Nevertheless, all sites were committed to delivering high-quality care and described numerous attempts to overcome challenges as well as some successes achieved over time.

Conclusion: Findings from this qualitative study will be leveraged during the next, quantitative and economic analysis, phases to estimate the value of MoCs for patients with IA in Canada to support advocacy efforts for the resources required to establish and sustain MoCs.

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Comparison of Patient Outcomes and Satisfaction in Collaborative vs Usual Models of Care

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Objectives: Unacceptable wait times for patients with inflammatory arthritis continue to plague most regions in Canada, stimulating the need to find alternate, effective models of care. In Halifax, Nova Scotia, the rheumatology clinic implemented a collaborative care team comprised of a rheumatologist, family physician (FP), physiotherapist (PT) and nursing support. Follow-up visits for patients alternated between the rheumatologist

and the collaborative care team every 6 months. The purpose of this study was to evaluate disease activity and patient satisfaction in the collaborative care model compared with the traditional specialist-patient model of care.

Methods: Patients 18 years of age or older with stable rheumatoid arthritis, ankylosing spondylitis, and psoriatic arthritis were invited to participate in the study. Patients were defined as "stable" if their last visit to their specialist was 6 months ago or more. In 3 consecutive follow-up visits, age, sex, diagnosis, DMARD use (Y/N), Health Assessment Questionnaire (HAQ) score, Clinical Disease Activity Index (CDAI) score, tender joint count (TJC), swollen joint count (SJC), Arthritis Self-Efficacy sore, and patient satisfaction score were collected. The characteristics of participants were summarized as means with standard deviations, minimum and maximum (continuous variables), and as counts and percentages (categorical variables). An adjusted difference-in-difference model was used in the estimation of treatment effects.

Results: A total of 469 patients were enrolled in the study, 240 in the collaborative care group and 229 in the usual care group. At baseline: patients in the collaborative care group had a higher mean age (60.7 vs 57.9 years), HAQ score, (0.55 vs 0.42), CDAI score (5.64 vs 2.94), TJC (1.42 vs .41), and SJC (0.57 vs 0.10). Differences between the groups disappeared over time. The estimates of treatment effect for self-efficacy, patient satisfaction, and CDAI were not statistically significant. The treatment effect for SJC, TJC, and HAQ were negative and statistically significant, however, the magnitudes of the differences were too small to be clinically meaningful.

Conclusion: This study demonstrates similar outcomes in measures of function, disease activity, patient satisfaction and self-efficacy between the usual model of care and our collaborative care model. This model of care provides comparable care of stable patients with established diagnoses of inflammatory arthritis, which may free the rheumatologist to see a greater number of new patients and decrease wait times.

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A Snapshot of Hip and Knee Replacement Rehabilitation Care across Canada: Assessing Feasibility of a Clinician Quality Indicator Questionnaire

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Objectives: To 1) determine usability, feasibility and reliability of an online questionnaire to assess clinicians' self-reported adherence to rehabilitation quality indicators (QIs) for hip and knee replacement for osteoarthritis; and 2) capture a snapshot of current rehabilitation practice and quality of care across Canada.

Methods: An online questionnaire was created in REDCap™ and included sections on adherence to 10 QIs related to post-acute THR/TKR rehabilitation, practice characteristics and clinician demographics. Phase 1: Usability testing was conducted on the English language version with physiotherapists (PTs) and physical rehabilitation therapists (PRTs) in BC and Quebec who provide THR/TKR rehabilitation. Patient and clinician partners co-led the in-person or phone sessions using the "think aloud" approach to identify issues related to readability, acceptability and technology. All participants provided informed consent. Phase 2: Survey participants were recruited across Canada through health professional and patient organizational e-blasts and newsletters, Twitter, and word of mouth. Respondents selected the THR and/or TKR questionnaires based on caseload and provided their email address if willing to complete the survey 1-2 weeks later (test-retest reliability). Two $25 gift card prize draws were offered as incentives. The University of British Columbia Behavioural Research Ethics Board and CIUSSS in Quebec approved this study.

Results: Phase 1: Eight physiotherapists (BC = 7, Quebec = 1) from urban and rural settings, public and private sectors, and a PRT completed the usability testing. Overall, questionnaire readability, format and length were acceptable with minor changes in wording suggested. However, QI adherence response options (i.e., 0 to 100%) were considered burdensome

and difficult to answer resulting in change to an alternate, validated 5-point scale (never, rarely, sometimes, often, always). This was re-tested with a single PT and confirmed acceptable by previous testers. Our clinician co-investigator and Quebec participants recommended a French language version which is to be launched shortly. Phase 2: To date, 35 PTs from 5 provinces have completed the survey. Majority work in the public sector (77%) yet varied practice settings. On average, PTs report meeting (i.e., 'always' response) 20% (SD 15%) of TKR and 13% (SD 11%) of THR indicators. Varied rehabilitation formats, duration and dosage are described. Test-retest reliability will be determined when all data are available.

Conclusion: PTs report low levels of adherence to 10 post-acute THR/TKR rehabilitation QIs. Early results suggest marked variation in the delivery, quantity and quality of THR/TKR rehabilitation care in Canada. Efforts are underway to address these evidence-practice gaps through implementation of QI toolkits.

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Patient Informed Feasibility Testing of Two Methods to Assess Quality of Rehabilitation Care after Total Joint Replacement Surgery for Osteoarthritis

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Objectives: To 1) assess the usability of online questionnaires to collect quality indicator (QI) adherence data from patients; and 2) test the feasibility of collecting patient reported and chart audit-based QI data at time of discharge from total hip (THR) and total knee (TKR) replacement rehabilitation.

Methods: The research and patient co-leads worked with 2 patient partners to co-design the patient QI questionnaire; conduct usability testing; and launch the pilot testing in 3 local outpatient departments. A physiotherapist (PT) at each site served as the coordinator/clinical champion to recruit 20 eligible patients at time of discharge to complete the questionnaire and track feasibility data. An independent PT extracted data on 10 QIs from patient charts to permit comparison of QI pass rates between two data sources.

Results: Usability testing (n = 8 patients) resulted in small changes to the questionnaires to improve wording and clarity. Over a 9-month period, the 3 sites recruited a total of 97 patients: 61 provided informed consent (62.8% mean conversion rate); of these 56 completed the online survey (91.8% conversion rate); and 100% had chart audits performed. Site coordinators spent on average < 30 minutes/week to screen, recruit and track participants. A majority of patients were female (59%), aged 65-74 years (59%), had a primary TKR (63%), and received on average 6-10 weeks of outpatient rehab. Patient reported QI adherence was higher than audit-based levels for all QIs with overall average pass rates of THR 46% (SD 27%) and TKR 49% (SD 25%) in patient surveys, and THR 24% (13%) and TKR 11% (13%) in chart audits. Individual QI pass rates differed markedly and across sites. At point of discharge, HOOS and KOOS short form normalized values were 61.2 (16.4) and 61.2 (8.37), respectively. Patients were most satisfied with their day-to-day function (95%) and least satisfied with their ability to take an active role in their rehab (86%); THR patients were less satisfied across all questions.

Conclusion: Overall pass rates for 10 post-acute TJR rehab QIs were low with patients reporting significantly higher values than recorded through chart audits. Low and inconsistent QI adherence may be partly explained by poor documentation, patient recall bias and their interpretation of the QI statements. We are working with our patient and clinician advisory committee to explore these discrepancies and refine both tools prior to using them in a planned QI implementation study.

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Evaluating TB Screening for Biologic DMARD Initiation in Northern Alberta

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Objectives: We studied the pathway of tuberculosis (TB) screening in inflammatory arthritis (IA) patients initiating biologic disease modifying anti-rheumatic drugs (bDMARD) therapy in northern Alberta. Our aim was to evaluate barriers to timely initiation of bDMARDs.

Methods: The RAPPORT (Rheumatoid Arthritis Pharmacovigilance Program for Northern Alberta) registry was used to identify all patients with IA (rheumatoid or psoriatic) referred for bDMARD initiation from 2013 – September 2019. We identified patients with positive tuberculin skin tests (TSTs) and/or other risk factors requiring referral to TB services and QuantiFERON (QFG) testing. RAPPORT, E-Clinician EMR and iPHIS (Integrated Public Health Information System) were used to collect specific time points including: time to TB consultation; recommendation for QFG testing and/or latent TB (LTBI) therapy. A randomly selected control sample from RAPPORT of low TB risk patients was used to compare outcomes.

Results: From the 1291 RAPPORT IA patients assessed for biologic initiation between 2013 and April 2019, 99 patients (7.7%) were identified as high risk for LTBI and referred to TB services. Seventy-three (73) (73.7%) had abnormal TSTs (> 10 mm). Mean time between referral and consultation of 96 patients seen by TB services was 32 days (SD 55). Post TB consultation, thirty-nine (39.3%) QFGs were ordered, 4 (4%) being positive. Latent TB treatment was recommended to sixty patients (60.6%). Mean duration from rheumatologist referral to first bDMARD dose was 137 days (SD 113) for the TB cohort compared to 47 (SD 32) for the control group. Delaying factors included: (1) TB services consultation including QFG testing and (2) initiation of LTBI therapy. Baseline mean DAS and HAQ for the TB group compared to the controls were 6.19 (SD 1.24) and 1.62 (SD 0.54) compared to 5.8 (SD 1.20) and 1.46 (SD 0.54) for controls. At 3 months, DAS and HAQ were 3.79 (SD 1.6) and 1.08 (SD 0.62) for TB group compared to 3.48 (SD 1.45) and 0.90 (SD 0.60) for controls. At 9-12 months, DAS remission (< 1.6) was achieved in 10 patients (10%) in the TB group compared to 17 (17%) in controls.

Conclusion: Patients at high risk of LTBI had delays in biologic initiation due to waits for TB services consultation, QFG testing, and initiation of LTBI therapy. Strategies to reduce wait times include widespread access to QFG testing as part of biologic pre-screening.

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Were Canadian Pediatric Rheumatologists Already Practicing According to the 2019 American College of Rheumatology Juvenile Idiopathic Arthritis Guidelines Before They Were Published?

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Objectives: New guidelines for the management of juvenile idiopathic arthritis (JIA) in children with non-systemic polyarthritis, sacroiliitis, and enthesitis were published by the American College of Rheumatology (ACR) in June 2019. Similar to previous ACR guidelines for JIA, recommendations were provided for treatment group phenotypes as opposed to ILAR categories. Our aims were to describe the existing medication prescribing practice of Canadian pediatric rheumatologists for JIA treatment phenotypes, and to determine whether Canadian pediatric rheumatologists were already practicing in accordance with the new guidelines before they were published.

Methods: We used data from the Canadian Alliance of Pediatric Rheumatology Investigators (CAPRI) JIA registry for newly diagnosed children enrolled between February 2017 and May 2019. This interval was selected to best capture current therapy trends just prior to publication of the new ACR guidelines. Data was analysed to identify phenotypes and situations for which a strong or conditional recommendation was provided in the guidelines. Then, the proportions of cases in which the physician prescribed medications in line with the relevant guideline recommendations were calculated.

Results: 266 patients were enrolled (61% female, median age 7.8 years), of whom 186 (70%) had a history of 4 or fewer joints involved, 42 (16%) had non-systemic polyarthritis, 16 (6%) had sacroiliitis, and 8(3%) had enthesitis. At presentation, the mean physician global assessment score was 3.3 (SE = 0.14). Patients with non-systemic polyarthritis were prescribed initial DMARD and NSAID in 95% of cases rather than NSAID monotherapy. Methotrexate was the initial DMARD in all cases. Subcutaneous (versus oral) methotrexate was prescribed in 57% of patients. A bridging course of oral prednisone was prescribed for 30% of patients and intraarticular corticosteroids for 17%. Biologic medications were always started in combination with DMARD therapy. For sacroiliitis, initial treatment with NSAID was common (85%). Therapy was escalated in 70% of cases, and the next step in therapy was either a DMARD (71%) or biologic (29%). Bridging oral prednisone was prescribed in 20% of cases. For enthesitis, initial treatment always included NSAID (100%). Therapy was escalated in 75% of cases and next step in therapy was always a DMARD.

Conclusion: This small prospective cohort suggests Canadian pediatric rheumatologists were overall practicing according to the ACR JIA treatment guidelines before they were published, except that a substantial proportion of patients received oral instead of subcutaneous methotrexate and a DMARD was frequently used in sacroiliitis and enthesitis, instead of escalating directly from NSAID to biologic medications.

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Myositis in SLE

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Objectives: Myositis is thought to be relatively uncommon in systemic lupus erythematosus (SLE), although little is published on the topic. We previously demonstrated univariate associations between SLE and myositis, including seropositivity to several antibodies. We used multivariate analyses of a case-cohort sample to define potential independent risk factors for myositis in SLE.

Methods: Our case-cohort analysis was based within the SLE McGill University Health Center (MUHC) cohort, which enrolls unselected patients from the time of their first clinic visit. Among patients with at least one baseline clinic visit between 2000-01-01 and 2018-06-30, we identified myositis cases, and selected a random 20% sample of the baseline cohort, in order to create risk-sets of controls (at each time-point that a case occurred). Potential myositis cases were identified using the SLICC damage index for muscle weakness or atrophy, and the SLEDAI-2K item for myositis, at any point from the baseline visit until study end date (last visit or June 30, 2018). Cases were confirmed through chart review. Our multivariate proportional risk models included baseline demographic variables (sex, race/ethnicity, and age at SLE diagnosis).

Results: Our sub-cohort included 121 patients (111 female, 92.7%). Eleven cases of myositis were identified, of which nine (81.8%) were female. The majority (N = 9, 81.8%) of myositis cases were non-white, versus 34.5% of the non-myositis SLE comparators. In the multivariate analyses, SLE patients of non-white race/ethnicity were more likely to develop myositis compared to those of white race/ethnicity (HR 7.14, 95% CI 1.44, 35.4). Multivariate analyses also suggested SLE patients with anti-Smith antibody

positivity at least once (any time from baseline to time of risk-set date) were more likely to develop myositis than patients that had been consistently anti-Smith negative (HR 5.94, 95% CI 1.29, 27.4).

Conclusion: Our multivariate analyses suggest that in this SLE sample, male sex, non-white race/ethnicity, and anti-Smith antibody positivity were more common among myositis cases versus non-cases. Additional analyses are planned to assess myositis and ILD-related autoantibodies in this case-cohort sample.

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Case Report: Immune-Mediated Necrotizing Myopathy Flare after PCSK9 Inhibitor Initiation

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Background: The immune-mediated necrotizing myopathies (IMNMs) are characterized by muscle weakness, elevated creatine kinase (CK), and signs of necrosis as well as an absence of inflammatory infiltrates on muscle biopsy. Statin-associated immune-mediated myopathy (SAIMM) is a rare type of IMNM that is differentiated from self-limited statin-induced myopathy in that the symptoms and CK elevation persist well after the statin is discontinued. The role of PCSK9 inhibitors, an alternative lipid-lowering therapy, in this disease has not been previously explored.

Case Presentation: Here, we describe a case of a 66-year-old man who had been on atorvastatin 40mg daily since 2010. He presented in November 2015 with a one-month history of subjective proximal and distal weakness with associated myalgias. Bloodwork at that time showed a CK of 3407 U/L, at which point his statin was discontinued. Screening bloodwork revealed a weakly positive ANA with a nucleolar pattern but a negative workup otherwise. Thereafter, over the course of 2016, his CK gradually decreased to a nadir of 441 U/L in November 2016 and he had a gradual resolution of his symptoms as of early 2017. In late February 2017, he was started on evolocumab, a PCSK9 inhibitor, for control of his hyperlipidemia, but he developed an elevation of his CK to 2019 with an associated return of his proximal lower leg subjective weakness and myalgias. Although evolocumab was discontinued shortly thereafter, his symptoms progressed and his CK increased to 5991 U/L in January 2018. Muscle biopsy of the right biceps was consistent with IMNM. He was thereafter started on prednisone 50mg daily in May 2018 and methotrexate as a steroid sparing agent in July 2018 with his CK decreasing to 787 U/L on July 25, 2018. Since then, he has continued to improve and is now in remission.

Conclusion: This case details a patient who presented with a CK elevation with symptoms of weakness and myalgias that improved after his statin was discontinued over the course of a year. Yet, shortly after starting evolocumab, he had a return of his symptoms with a persistent CK elevation. This pattern of presentation raises the question of the role of PCSK9 inhibitors in IMNM development despite no previously established association in the literature. Thus, although we are unable to conclude the role of the PCSK9 inhibitor in the development of our patient's IMNM, further research is warranted to explore this relationship.

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Lyme Disease Masquerading as a Flare of Giant Cell Arteritis

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Background: Few case reports exist of Lyme disease masquerading as giant cell arteritis or polymyalgia rheumatica. The symptoms of both diseases can overlap significantly, leading to potential misdiagnosis. Common symptoms include headache, arthralgias, myalgias, elevated inflammatory markers, fatigue, and malaise. Differentiating features include scalp tenderness, jaw and limb claudication, and visual changes in GCA, versus erythema migrans, peripheral neuropathy, meningitis, Bell's palsy, and cardiac manifestations including myocarditis, pericarditis, and AV nodal block in Lyme disease.

Case Presentation: A 76-year-old man with a history of giant cell arteritis (GCA) and polymyalgia rheumatica (PMR) approaching the end of a year-long prednisone taper, at a current dose of 4mg/day, presented to the emergency department with a one-week history of suspected flare of his GCA/PMR symptoms. He presented with weakness, new frontal headache without any visual changes and difficulty ambulating especially on stairs. His inflammatory markers were elevated with an ESR of 41 and a CRP of 39.5. He was admitted and treated with high dose oral steroids with subsequent resolution of his symptoms and was discharge five days later. As he tapered his prednisone, he felt a return of his symptoms with new neck stiffness this time. His prednisone was increased to 60 mg per day, but the next day he presented to the emergency department with worsening neck stiffness, headache, and a two-hour period of visual changes. His inflammatory markers at that time were low, with an ESR of 11 and a CRP of 1.0. An ophthalmology assessment deemed that he had no active vasculitic change in his eye, and that the blurriness was a result of the increased prednisone dose. Further testing revealed positive Lyme serology. Infectious disease was consulted, and he was treated with a two-week course of doxycycline. Within two days he had complete resolution of his symptoms. Upon review, it was felt that his initial "flare" leading to admission was likely due to acute Lyme disease. His prednisone was rapidly tapered down to his original 4mg/day dose without any recurrence of symptoms.

Conclusion: In patients with a presentation suggestive of giant cell arteritis or polymyalgia rheumatica who have a history of possible exposure to Borrelia burgdorferi, Lyme disease should be considered as part of the differential in order to prevent morbidity.

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Ultra-high Pulse of Oral Steroids in Acute Inflammatory Myositis

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Background: Intravenous glucocorticoids are considered first-line treatment in inflammatory myositis. We communicate the first reported case of a patient with acute inflammatory myositis treated successfully with an oral pulse of prednisone 1250mg daily for 5 days, eliminating the need for hospitalization or daily clinic visits for intravenous steroid administration.

Case Presentation: A 24-year-old female with seropositive rheumatoid arthritis managed with methotrexate (MTX) 20mg PO weekly and hydroxychloroquine 300mg PO daily presented to an outside hospital with a 1 month history of increasing proximal muscle weakness, jaw fatigue, and dyspnea on exertion. Her CK was 12271 U/L. Autoimmune workup revealed a positive ANA (1:640, homogenous pattern) as well as antibodies to Ro-60, Ro-52, signal recognition particle, and cytosolic 5-nucleotidase 1A. MRI of her left upper limb showed diffuse increased T2 and STIR signal in the triceps brachii muscle. A biopsy of her left tricep brachii muscle demonstrated myopathic changes with significant endomysial inflammatory infiltrate consistent with inflammatory myopathy. She was started on oral prednisone 60mg daily on admission and maintained on MTX. Hydroxychloroquine was discontinued. She left hospital against medical advice to return home and was reviewed at our clinic the following day. She had 4-/5 weakness in the proximal muscles of her limbs and in her neck flexors. She complained of dyspnea but her chest was clear to percussion and auscultation. She had no difficulty swallowing. Her CK of 13163 U/L. As she preferred to manage at home, it was decided in consultation with neurology to treat her with oral pulse of prednisone 1250mg PO daily for 5 days, followed by prednisone 80mg daily. She had no adverse effects to the high dose oral prednisone therapy. Two weeks later, she was treated with rituximab 1g intravenously on two occasions two weeks apart. She subsequently regained strength in her neck flexors and proximal muscles. Her CK level 12 weeks post diagnosis was 448 U/L and she is successfully tapering her prednisone.

Conclusion: To our knowledge, no published studies have compared efficacy, safety, or tolerability of this ultra-high dose oral prednisone pulse with the conventional pulse therapy of 1 gram IV methylprednisolone daily for 3 days in the treatment of acute myositis. Equivalent bioavailability, gastric

tolerance, and excellent compliance have been demonstrated in multiple sclerosis patients. We suggest that a 5 day pulse of ultra-high oral prednisone may be considered in the treatment of certain patients with acute inflammatory myositis who do not require hospitalization.

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Anti-Valosin-Containing Protein (VCP/p97) Autoantibodies as a Diagnostic Biomarker in Inclusion Body Myositis

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Objectives: Valosin-Containing Protein (VCP/p97) is an abundant ATPase with a key role in protein homeostasis. Autosomal dominant mutations of VCP have been described in four main phenotypes, including hereditary inclusion body myopathy (hIBM). Autoantibodies to VCP (anti-VCP) have only been reported in glaucoma and primary biliary cholangitis (PBC), but not in inflammatory myopathies. Since some autoantibody targets are altered or mutated native proteins, we sought to determine the frequency, sensitivity, specificity and clinical significance of anti-VCP/p97 as a biomarker in sporadic IBM (sIBM). We also aimed to determine if anti-nuclear antibody (ANA) indirect immunofluorescence (IIF) staining of HEp-2 cells is useful in screening for anti-VCP/p97 antibodies.
Methods: Sera from sIBM patients and controls were stored at -80°C until analysis. IgG antibodies to VCP/p97 were detected by addressable laser bead immunoassay (ALBIA) using a full-length human recombinant protein (Novus Biologicals) and a cutoff of 300 median fluorescence units (MFU), which was two standard deviations above the mean of healthy controls. Sera from patients with various myopathies were used as comparative controls. ANA was detected and imaged by IIF on HEp-2 substrate (Inova Diagnostics, San Diego, CA) at a serum dilution of 1/80.
Results: 75 patients with sIBM and 288 disease control patients with PBC (n = 105), Juvenile Dermatomyositis (JDM) (n = 67), Juvenile Idiopathic Arthritis (JIA) (n = 47) and other inflammatory myopathies (n = 69) were included, as well as 40 healthy controls. 16.0% of sIBM patients were positive for anti-VCP/p97. The overall frequency of anti-VCP/p97 in disease controls was 9.7%. Frequencies in specific diseases included: PBC 13.3%, JDM 1.5%, JIA 2.1%, and other inflammatory myopathies 17.4%. The overall sensitivity, specificity, positive predictive value, and negative predictive value of anti-VCP/p97 for sIBM was 0.16, 0.90, 0.30, and 0.80 respectively. 8.0% of sIBM patients were positive for anti-VCP/p97 but negative for anti-NT5c1A autoantibodies. 8.0% of sIBM patients were dual positive for anti-VCP/p97 and anti-NT5c1A autoantibodies. Of 20 patients who were positive for anti-VCP/p97, 15 (75%) showed a nuclear fine speckled (AC-4) pattern.
Conclusion: By ALBIA, anti-VCP/p97 had poor sensitivity but a relatively high specificity for sIBM. Anti-VCP/p97 may be a useful biomarker for diagnosing inflammatory myopathies. The clinical and pathological features of anti-VCP/p97postive myopathies requires further study and this autoantibody may fill a gap in seronegative sIBM. A nuclear fine speckled pattern on ANA IIF on HEp-2 cells may indicate the presence of anti-VCP/p97.

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Evaluation of Anti-NT5c1A Autoantibodies as a Diagnostic Biomarker in Juvenile Dermatomyositis

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Objectives: Autoantibodies to 5'-nucleotidase 1A (NT5c1A/Mup44) have been reported as a biomarker in sporadic inclusion body myositis (sIBM). Among the disease controls, the frequency of anti-NT5c1A in our reported juvenile dermatomyositis (JDM) cohort (n=40) was 0%. This was inconsistent with other studies in the literature, which reported a frequency of 27% in JDM. Concerned about an unintended bias in our report, we attempted to resolve the discrepancy by increasing our JDM cohort and to determine the sensitivity and specificity of anti-NT5c1A in JDM. Additionally, we re-evaluated anti-nuclear antibody (ANA) indirect immunofluorescence (IIF) staining on HEp-2 cells in JDM as a potential screening method for anti-NT5c1A.
Methods: Sera from JDM patients and controls were stored at -80°C until required for analysis. IgG antibodies to NT5c1A were detected by an addressable laser bead immunoassay (ALBIA) using a full-length human recombinant protein as previously reported and established the cutoff of 600 median fluorescence units (MFU), which was two standard deviations above the mean of healthy controls. We compared our results to our recently reported disease and healthy controls, measured with the same immunoassay. ANA was detected by IIF on HEp-2 substrate (Inova Diagnostics, San Diego, CA).
Results: We analyzed the sera of 77 additional JDM patients and compared them to 458 disease controls with other autoimmune inflammatory myopathies (n = 116), systemic lupus erythematosus (n = 199), systemic sclerosis (n = 50), rheumatoid arthritis (n = 27), Sjögren's syndrome (n = 19), and degenerative diseases (n = 47), as well as 78 healthy controls. In the new JDM cohort, 36/77 (46.8%) were positive for anti-NT5c1A. Combined with our previously reported 40 JDM patients, the new frequency in JDM is 36/117 (30.8%). 60/458 (13.1%) of disease controls were positive for anti-NT5c1A. Among these disease controls, the frequency among dermatomyositis patients was 2/57 (3.5%). The sensitivity, specificity, positive and negative predictive values of anti-NT5c1A in JDM were 0.31, 0.87, 0.38, and 0.83 respectively. Among 25 JDM patients who were positive for anti-NT5c1A, the ANA IIF on HEp-2 substrate did not demonstrate a consistent staining pattern for anti-NT5c1A antibodies.
Conclusion: With the additional JDM patients added to our cohort, the frequency of anti-NT5c1A in JDM was 30.8%. Although anti-NT5c1A antibodies are relatively common in JDM compared to other non-sIBM diseases, they have a low sensitivity for JDM. Screening for anti-NT5c1A antibodies using ANA IIF on HEp-2 substrate is unlikely to be useful in detecting these autoantibodies.

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Anti-NT5c1A Autoantibodies in Systemic Lupus Erythematosus

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Objectives: Autoantibodies to the cytosolic 5'-nucleotidase 1A (NT5c1A/Mup44), best known as a biomarker in sporadic inclusion body myositis (sIBM), have also been reported in multiple autoimmune diseases, including systemic lupus erythematosus (SLE). Previous studies have reported a frequency of anti-NT5c1A in SLE of up to 21% and, in one study, were associated with the presence of multiple autoimmune disease in the same patient (polyautoimmunity). The primary objective of this study was to elucidate the clinical significance of anti-NT5c1A in our Calgary cohort of SLE patients (STARLET).
Methods: Sera were obtained at cohort enrollment from 207 SLE patients

registered in STARLET. Their sera were stored at -80°C until required for analysis. IgG antibodies to NT5c1A were detected by an addressable laser bead immunoassay (ALBIA) using a full-length human recombinant protein and the cut-off was 600 median fluorescence units (MFU) based on values two standard deviations above the mean MFU of healthy controls.

Results: Of the 207 SLE patients, 34 (16.4%) were positive for anti-NT5c1A. Patients with renal involvement (as defined by SLICC criteria) were significantly less likely to be anti-NT5c1A positive (OR 0.36, 95%CI: 0.13-0.98). Patients with hemolytic anemia were more likely to be anti-NT5c1A positive but this was not statistically significant (OR 3.14, 95% CI: 0.98-10.04). Two patients had documented inflammatory myositis overlap, one of which was positive for anti-NT5c1A antibodies.

Conclusion: The frequency of anti-NT5c1A antibodies in our SLE cohort is consistent with other published reports. We found that SLE patients with renal disease were less likely to be anti-NT5c1A positive, raising the possibility that this autoantibody may have a protective effect. Additionally, there was a trend towards anti-NT5c1A positivity among patients with hemolytic anemia. Further longitudinal studies of larger SLE cohorts are needed to interrogate the pathophysiological mechanisms of anti-NT5c1A in order to better understand these clinical correlations.

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Functional Popliteal Artery Entrapment Syndrome as a Mimicker of Musculoskeletal, Rheumatologic, and Myofascial Lower Extremity Pain

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Background: Functional Popliteal Artery Entrapment Syndrome (FPAES) is a rare and diagnostically challenging condition affecting young, athletic adults and is often confused with other conditions.

Case Presentation: A 33-year-old female was referred to the Clinic for assessment of a 3-year history of Raynaud phenomenon and possible vasculitis. Her Raynaud episodes occurred during the winter and affected her feet more frequently than her hands. She also had a three-year history of progressive severe exertional pain with claudication in her calves and feet. She was unable to walk for more than 5 minutes secondary to calf pain. She did not give a history of rashes, skin tightness, dysphagia or reflux symptoms, joint pain, chest pain or dyspnea. She had been diagnosed and treated for chronic exertional compartment syndrome and had undergone two unsuccessful bilateral fasciotomies. Her medical history includes hypothalamic hypoestrogenism managed with estrogen replacement therapy, and irritable bowel syndrome. She is lifetime non-smoker. Her physical exam was normal except for bluish discoloration of her toes. Her laboratory tests, including a serological profile, were normal. She was referred to Vascular Surgery for assessment. Vascular ultrasound of her lower limbs showed slow venous flow in her legs. MR angiography (MRA) of her lower limbs was normal. A diagnosis of severe Raynaud phenomenon was made by default. She was treated with calcium channel blockers and nitroglycerin patches with no response. She then travelled out of country for a second opinion. She had a functional MRA as part of her assessment and a diagnosis of Popliteal Artery Entrapment Syndrome was made. She returned to our clinic for further assessment with her test results. We therefore conducted bilateral dynamic duplex arterial ultrasounds in her lower extremities and confirmed popliteal artery entrapment between the medial head of the gastrocnemius muscle and the posterior tibial eminence with forced plantar flexion, severe on the left and moderate on the right. The management of this condition includes Botox therapy to relieve the arterial entrapment and resolve her claudication. If there is no response she will progress to definitive surgical management.

Conclusion: FPAES is a rare and diagnostically challenging condition affecting young, athletic adults and is often confused with other vascular, rheumatologic, musculoskeletal and myofascial conditions. Given its dynamic nature, imaging protocols need to be modified to provoke entrapment in order to increase sensitivity and to avoid misdiagnosis. Clinicians should have a high index of suspicion for FPEAS in young athletic patients with progressive and debilitating lower extremity claudication.

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Intratympanic Infliximab in Autoimmune Inner Ear Disease: Case Report and Literature Review

Ali Shams (University of Saskatchewan, Saskatoon); Sarah Oberholtzer (University of Saskatchewan, Saskatoon); Keltie Anderson (University of Saskatchewan, Saskatoon)

Background: Autoimmune inner ear disease (AIED) is defined as a rapidly progressive bilateral sensorineural hearing loss (SNHL), which responds to immunosuppressive therapy. The mainstay of treatment is corticosteroids. However, the variable response rates and well-known adverse effects associated with repetitive regimens preclude corticosteroids as an effective maintenance therapy. Similar to other auto-inflammatory diseases, AIED has been linked with the over expression of cytokines, and tumour necrosis factor alpha (TNF-alpha) is seen as a potential target for treatment. Furthermore, infliximab, an anti-TNF monoclonal antibody biologic, has shown some anecdotal evidence in effectively treating AIED. The following describes a case in which intratympanic injections of infliximab were utilized in the long-term treatment of AIED.

Case Presentation: A 26-year-old female diagnosed with AIED by an ENT specialist was referred to Rheumatology for further management. The patient presents with progressive bilateral SNHL (moderate -right ear and severe -left ear, with severe speech discrimination bilaterally) for many years with one severe episode of vertigo. Her past medical history is notable for recurrent otitis media and tympanic membrane perforations which required 9 surgical interventions. Initial MRI and otomicroscopic evaluations were unremarkable. Lab investigations including: CRP, ANA, RF, ANCA, vasculitis panel, Anti-CCP, C3/C4 complements, lupus anticoagulant, cardiolipin, CBC and electrolytes, were all within normal limits. On examination, she presents with SNHL but no other stigmata of autoimmune disease were appreciated.

Initial treatment was prednisone 60 mg daily for one month followed by a tapering dose. Audiometry evaluation showed remarkable results with normal hearing in the right ear and moderate conductive hearing loss in the left ear. However, once the prednisone was weaned to 25 mg daily, the patient began to experience hearing deterioration bilaterally and developed severe insomnia and distal leg pain. Azathioprine was then trialed but discontinued after one month due to alopecia. Next, infliximab infusions were trialed over a 6-month period with less significant benefit compared to as seen on prednisone. Intratympanic injections of infliximab were then trialed with excellent symptomatic control with major improvements in hearing and no recurrence of vertigo.

Conclusion: This case presents a patient who responded well to intratympanic infliximab injections in the treatment of AIED, however, its use remains only anecdotal in the literature. Randomized control trials should be conducted to study the symptomatic response, long term-term adverse effects, and establish standard doses and durations of this therapy for AIED.

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A Weak Diagnosis for Weakness

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Background: The following case presentation explores a challenging diagnosis for proximal muscle weakness responsive to high dose corticosteroids, which is atypical in patients suffering from Limb-Girdle Muscular Dystrophy (LGMD).

Case Presentation: A 28-year-old post-partum female is referred to Rheumatology by Internal Medicine for progressive proximal muscle weakness and increase in creatine kinase (CK). On review of systems, the patient endorsed chronic diarrhea with nocturnal symptoms and persistent inflammatory low back pain. Initial examination yielded 2/5 strength in the upper and lower limbs, the rest of the physical examination was within normal limits. No other peripheral stigmata of autoimmune disease

were appreciated. Investigations were notably positive for: CK of 2900, anti-Mi-2 antibodies and an ANA of 1:160. Autoimmune hepatitis panel and dsDNA was negative. MRI imaging of her lower extremities were consistent with diffuse myositis, but 2 subsequent biopsies were entirely normal. As the patient's CK continued to rise and her symptoms worsened she was prescribed a course of high dose corticosteroids with significant response. Upon follow-up her motor examination was 5/5 in the upper and lower limbs but her CK remained abnormally high. At this juncture the patient was referred for genetic testing and was diagnosed with LGMD type 2L.

Conclusion: LGMD is a rare genetic disease that results in progressive muscular atrophy predominantly affecting the hips and shoulders. LGMD exhibits an autosomal dominant pattern of inheritance and sadly there exists no cure or effective treatments.

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The Impact of eHealth Tools on Patients' Recovery after Total Hip and Knee Replacement Surgery: Systematic Review

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Objectives: Osteoarthritis (OA) is one of the main causes of mobility impairment worldwide and most commonly results in hip and knee replacement surgeries. This study aimed to compare the impact of eHealth tools (e.g. online education) with usual care on the outcomes of patients who had hip or knee replacement surgery due to OA.

Methods: To select eligible randomized and non-randomized control trial studies, 6 electronic databases (i.e. Ovid MEDLINE, Embase, Cochrane Controlled Register of Trials (Central), CINAHL, Web of Science, and Google Scholar) were searched. Both preoperative and postoperative eHealth interventions were eligible to be included in this systematic review. Articles were included if they were 1) quantitative studies of the hip/knee replacement surgeries; 2) published in peer-reviewed journals; 3) published in English; 4) on patients with hip/knee osteoarthritis; and 5) investigated the impact of eHealth tools.

Results: Initially, 100082 records were found. Twenty-six studies met the inclusion criteria and were included. The main focus of the included studies was on investigating the impact of eHealth tools on patients; physical outcomes (21 studies) and psychosocial outcomes (17 studies). Five studies investigated the impacts of economical outcomes of eHealth tools. In general, the findings showed the benefits of eHealth tools on patients; outcomes were similar to the benefits of the usual care. However, eHealth interventions were more cost-effective than usual care interventions. The quality of most studies ranged from poor to fair.

Conclusion: Based on the findings of this study, eHealth interventions are as effective as usual care interventions but may be more cost-effective. This is an important finding that highlighted the crucial role of eHealth interventions in reducing the burden on the health care system and health care users.

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Education and Exercise Incorporating Principles of Neuromuscular Facilitation: A Pilot Study

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Objectives: Progressive neuromuscular exercise (NEMEX) has been shown to help people with hip and knee osteoarthritis (OA) reduce the progression of their symptoms and improve their function and quality of life. NEMEX principles were incorporated into a standardized community-based education and exercise program (Stay Active Plus) and evaluated to determine value to clients and feasibility of expanding the program across the province of Ontario.

Methods: Adults with OA of the hip or knee were referred to the Stay Active Plus group program by community health professionals or through self-referral. The program was delivered by a physical therapist trained in NEMEX principles and consisted of an educational session on OA followed by four sessions of supervised land-based exercise and eight structured home sessions. Outcomes included validated surveys measuring mobility (40 metre walk, sit to stand test), function (HAQ) and joint specific outcomes (HOOS, KOOS). Pre and post analyses examined changes in outcomes from baseline to immediate post intervention. Client satisfaction was evaluated using an Arthritis Society Client Satisfaction Survey.

Results: 47 people were referred to the program; 7 withdrew or did not complete the program. There were 2 no shows. This left 38 people (80.8%) who completed the program. Most participants were female (79%) with an average age of 67.9 years (range: 50-82 years). Most had knee OA (63%); 37% had hip OA. There were statistically significant improvements in the 40-meter walk test and pain, sleeping over the last week and global arthritis activity in the past 24 hours as measured by the HAQ (P < 0.05). There were also clinically important changes (>15% improvement) in pain, fatigue, sleeping and arthritis activity. 35 clients completed satisfaction surveys. Over 90% of participants agreed or strongly agreed that the program increased their knowledge about joint protection strategies and the importance of exercise and physical activity and they were more confident in their ability to manage their arthritis, complete neuromuscular activities at home and incorporate correct movement patterns into their daily lives.

Conclusion: These results suggest that the Stay Active Plus supervised group and home-based program model incorporating NEMEX principles has the potential to improve outcomes for people with hip and knee OA. Further studies are needed that incorporate long term outcomes and a comparison group.

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Persistence and Adherence to Parenteral Osteoporosis Therapies: A Systematic Review

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Objectives: As with many chronic diseases, treatment of osteoporosis is frequently impaired by suboptimal medication compliance, resulting in an increased risk of fracture and with resulting morbidity. A recent systematic review of real-world persistence and adherence to oral bisphosphonates showed mean persistence for 1-year and 2-years ranged from 17.7% to 74.8% and 12.9% to 72.0%, respectively. Adherence ranged from 28.2% to 84.5% and 23% to 50% over 1 year and 2 years, respectively. This systematic review examines real-world patient adherence to parenteral osteoporosis therapies.

Methods: A literature search was conducted using PubMed, Medline and EMBASE databases for English language articles published up to September 2018. Prospective and retrospective observational studies that examined patient adherence and/or persistence to parenteral osteoporosis treatments (teriparatide sc, ibandronate iv, zoledronic acid iv, and denosumab sc) in adults with osteoporosis were included. Studies with self-reported adherence or persistence data and those with subject number less than 20 patients were excluded. Quality assessment of included studies was completed using The Newcastle-Ottawa quality assessment scale (NOS).

Results: We reviewed 823 abstracts. Of these, 299 were selected for full manuscript review and 41 qualified for data extraction. Teriparatide adherence was reported in 28 studies, with data showing 1-year and 2-year persistence rates of 24-87% (median 55%) and 10-69% (median 29.5%) respectively and adherence rates of 21-89% (median 54%) and 40-68% (median 54%) respectively. Zoledronic acid adherence was reported in 10 studies, with 1-year and 2-year persistence rates of 34-100% (median 100%) and 20-75% (median 38%) respectively and adherence rates of 61-100% (median 100%) and 96% respectively. Ibandronate adherence was reported in 10 studies, with 1-year and 2-year persistence rates of 31-58% (median 39%) and 13-35% (median 25%) respectively and adherence rates of 21-72% (median 47%) and 15-58% (median 37%) respectively. Denosumab was reported in 19 studies, with 1-year and 2-year

persistence rates of 51-100% (median 79%) and 30-99% (median 45%) respectively and adherence rates of 48-100% (median 83%) and 46% respectively. Fourteen studies performed multivariate analysis and reported various statistically significant factors associated with non-persistence and/ or non-adherence including; female gender, other co-morbidities, treatment by a general practitioner and hospitalization. Included studies were robust and scored 6 to 8/9 on the NOS.

Conclusion: While the data are heterogeneous, included studies suggest superior persistence and adherence with parenteral osteoporosis therapies compared to data for oral bisphosphonates. To maximize adherence and persistence to parenteral therapies, it's important to consider patient specific determinants.

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Monoclonal Gammopathy in Psoriatic Arthritis

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Objectives: Monoclonal gammopathy of undetermined significance (MGUS) is an asymptomatic premalignant clonal plasma disorder, defined by the presence of a serum monoclonal protein (M-protein) at a concentration < 30 g/L, a bone marrow (BM) plasma cell percentage < 10%, and absence signs and symptoms related to multiple myeloma (MM). The prevalence of MGUS in psoriatic arthritis (PsA) has been reported to be higher than the general population. However, no follow-up is available to determine whether these patients progress to MM. The objective of this study was to determine the current prevalence of MGUS in the PsA cohort, evaluate the outcome of patients PsA – MGUS and determine any association of MGUS development and TNF inhibitors.

Methods: Included were patients followed at the PsA Clinic between January 2008 to January 2018. All patients fulfilled the CLASsification for Psoriatic Arthritis (CASPAR). MGUS was defined as the presence of a discrete band in the gamma- globulin region on at least 2 separate serum protein electrophoresis tests, performed 6 months apart. MM was the outcome of interest. Data extracted from our database included demographic variables, ESR level, use of conventional disease modifying antirheumatic drugs (cDMARD) and Biologic DMARDs (bDMARDs). Analyses included descriptive statistics [mean (SD) for continuous variables and frequency (percent) for categorical values]. Patients with MGUS were compared to those without using t -test, Wilcoxon test and Fisher test.

Results: Of the 883 patients assessed, 46 (5.3%) had evidence of MGUS on at least 2 separate blood tests. At the time of diagnosis 55.5% of patients were already on bDMARDs. Patients with MGUS had mean PsA duration of 14 years, were less likely to use DMARDs (30%), had more damage joints (24%), higher ESR levels (p = 0.0001), but equal number of actively inflamed joints compared to the control group. One patient evolved to MM. Both groups were similar in gender, race (Caucasian) and ages of PsA and PsO diagnosis.

Conclusion: The prevalence of MGUS among our cohort of patients with PsA was 5.2%, higher than the prevalence in whites (1.5% – 3%), but lower than the 9.7% reported by Eder et al. Only 1 patient progressed and died of MM, less than that expected in the general population. The presence MGUS was associated with measures of disease activity/severity (higher ESR levels and more damaged joints). There was no relationship to bDMARD.

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Comparison of Cutaneous Psoriasis and Psoriatic Arthritis in a Long-Standing Collaborative Dermatology/Rheumatology Clinic: A Real World Study

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Objectives: Psoriasis is a hyper-proliferative, auto-inflammatory, cutaneous disorder that is associated with inflammatory arthritis in approximately 20 to 30% of patients. There is an increasing trend to formally or informally establish collaborative practices between dermatology and rheumatology. The objective of this abstract is to compare the disease characteristics of cutaneous psoriasis (PsC) versus psoriatic arthritis (PsA) in a dermatology clinic that is closely affiliated with a rheumatologist.

Methods: A retrospective chart review in the dermatology clinic identified all psoriasis patients. Data was systematically retrieved from the charts using a standardized protocol that included demographic features, comorbidities, disease activity scores, and biologic use. Psoriasis and PsA diagnoses were made by a dermatologist, in the setting of a collaborative clinic. Descriptive statistics were generated to compare the retrieved data.

Results: 231 psoriasis patients were identified (50.2% females) of which 42.8% had PsA. For the PsC cohort the mean age of diagnosis of psoriasis was 31.2 years (18.4 SD). For the PsA cohort, the mean age of diagnosis of psoriasis was 34.0 years (17.9 SD), and the mean age of diagnosis of inflammatory arthritis was 45.3 years (13.3 SD). The time from onset of psoriasis to PsA diagnosis was 17.2 years when psoriasis age of onset was less than 40. When the onset of psoriasis was after the age of 40, the mean time to PsA diagnosis was only 2 years. The mean Psoriasis Area Severity Index (PASI) score was 7.2 (2.8 SD) for PsC, and 11.4 (7.47 SD) for PsA. The frequencies of comorbidities for PsC and PsA were the following: hyperlipidemia 9.5% and 21.2%; hypertension 19.8% and 31.3%; and depression 5.1% and 11.7%, respectively. The median number of biologics was 1 for PsC patients and 2 for PsA patients.

Conclusion: In a dermatology clinic closely affiliated with a rheumatologist, there was a higher prevalence of PsA than previously reported in the literature. Concomitant PsA was also associated with more severe skin scores (PASI), higher prevalence of comorbidities (hypertension, hyperlipidemia, and depression), and greater biologic use. This data suggests that identification of inflammatory arthritis from collaborative dermatology/rheumatology clinics leads to identification of more complex psoriatic patients.

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"Walking Into the Unknown…" Key Challenges of Family Planning and Pregnancy in Inflammatory Arthritis: A Systematic Review and Thematic Synthesis of Qualitative Studies

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Objectives: With recent improvements in therapies and management for rheumatic diseases, more women with inflammatory arthritis (IA) are considering pregnancy. To understand how to better support patients throughout the perinatal period, our objective was to conduct a systematic review and thematic synthesis of qualitative studies reporting patient and provider perspectives and experiences with family planning and pregnancy or providing care during family planning and pregnancy in the context of IA.

Methods: We conducted a search of MEDLINE, EMBASE, CINAHL and PsychINFO databases for studies meeting the following inclusion criteria: 1) primary research article or thesis; 2) study sample of women with IA (e.g. rheumatoid arthritis, systemic lupus erythematosus) or providers that care for them during pregnancy; 3) qualitative study design (e.g. focus groups, semi-structured interviews) capturing participants' view on family planning or pregnancy; and 4) published in English. We extracted findings from included studies including text, tables, and any supplementary materials and used thematic synthesis to construct concepts into descriptive themes. We further examined relationships between these concepts to develop higher-order analytical themes.

Results: Our search strategy identified 542 studies once duplicates were

removed. Following full-text review, we identified 9 studies. In total, they reported on the perspectives of 185 patients and 44 rheumatology providers spanning a range of geographic settings (i.e. Australia, Netherlands, South Africa, Denmark, United Kingdom, United States). Thematic synthesis identified 5 predominant analytical themes among patients: 1) seeking information and resources for pregnancy and arthritis; 2) making decisions about family planning and pregnancy in arthritis, 3) experiences with family planning and pregnancy; 4) impact of arthritis on self-perception and well-being of mothers; and 5) experiences with healthcare providers addressing pregnancy and arthritis. We also identified 3 predominant analytical themes among rheumatology providers: 1) the role of rheumatologists in family planning and pregnancy; 2) experiences of patient-provider relationships; and, 3) coordinating patient care with other providers.

Conclusion: Our thematic synthesis identified several challenges to pregnancy and family planning in the context of IA, particularly lack of available information and coordination between the patient's healthcare team. Knowledge translation initiatives providing relevant, practical, and consistent information as well as multi-disciplinary approaches to managing pregnancy in patients with IA are needed to improve care.

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Eosinophilic Granulomatosis with Polyangiitis Presenting with Myositis: A Case Report and Literature Review

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Background: Eosinophilic granulomatosis with polyangiitis (EGPA) is a systemic necrotizing vasculitis that affects small to medium sized vessels. Myalgias are often a common symptom of EGPA. However, it is rarely the main presenting symptom and typically not associated with weakness. We describe a case of EGPA patient presenting with eosinophilic myositis, who subsequently developed fulminant clinical EGPA. A literature review of similar cases is also summarized (Table 1).

Case Presentation: An 82-year-old Caucasian female presented with progressive pain and weakness over her shoulders and thighs, dysphagia, dyspnea, and 6 pounds weight loss over one month. Neurological examination revealed 3/5 strength in hip flexors. Strength testing was otherwise normal. Rest of her examination was unremarkable. Laboratory testing revealed leukocytosis (18.4×10^9/L), marked eosinophilia (8.8×10^9/L), hyperemia (2627 U/L), increased C-reactive protein (65 mg/L), and elevated rheumatoid factor (44 IU/mL). C3 and C4 were normal. ANA and PR3-ANCA were negative. MPO-ANCA was strongly positive at > 200.0. Infectious workup including cultures, and testing for TB, HIV, HBV, HCV, EBV, CMV and parasites was negative. Malignancy screen was negative. CT chest showed fluctuating opacities. Magnetic resonance imaging (MRI) of the lower extremity muscles showed diffusely abnormal T2 signal intensity throughout the musculature of the pelvis, buttocks, hips and thighs with minimal muscle atrophy. Muscle biopsy of the right vastus lateralis revealed findings in keeping with eosinophilic myositis (eosinophilic inflammatory cell infiltrate, no granulomas). High-dose oral prednisone was initiated at 1mg/kg daily. With steroids, there was notable improvement in her muscle strength, dyspnea and dysphagia. There was a dramatic decline in her CK and eosinophil count. During her hospital admission, she developed left foot drop associated with paresthesias. Neurological assessment and electrophysiological testing was consistent with mononeuritis multiplex. Treatment with intravenous cyclophosphamide was then initiated due to mononeuritis multiplex while on steroids. Within 2 weeks of treatment, laboratory testing showed white blood cell count 13.30×10^9/L; eosinophil count 0.010×10^9/L; and creatine kinase (CK) 259 U/L. Within 6 weeks of therapy, the patient was symptom-free with normalization of muscle strength and resolution of partial left foot drop.

Conclusion: It is important to consider EGPA in a patient presenting with myositis and peripheral eosinophilia. Although myositis is rarely the first presenting symptom in EGPA, patients can go on to develop other severe EGPA features, therefore it may provide an opportunity for early diagnosis and treatment to reduce risk of disease progression and morbidity.

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A Case Report of Takayasu Arteritis in Pregnancy

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Background: Takayasu arteritis (TAK) is a large vessel vasculitis primarily affecting young women of reproductive age. Management of TAK in pregnancy is complex and requires interdisciplinary collaboration. TAK has been associated with adverse maternal outcomes of hypertension and preeclampsia, congestive heart failure, caesarean delivery, as well as adverse fetal outcomes of low birth weight, prematurity, and intrauterine death.

Case Presentation: We present a case of first pregnancy in a 36-year-old patient with a longstanding, complicated history of TAK, with remote exposure to cyclophosphamide, prednisone and cyclosporine. She was off immunosuppressive treatment for eight years at the time of unplanned conception despite having an intrauterine device (IUD) in-situ. An attempt was made to retrieve the IUD with a hysteroscopy during pregnancy, but was unsuccessful. Her TAK had historically involved the left subclavian, left vertebral, right renal arteries, abdominal aorta, distal left peroneal, and bilateral anterior and posterior tibial arteries. She had a solitary functional kidney from renal artery involvement. Other prior manifestations of TAK included erythema nodosum, cutaneous vasculitis, scleritis and pan-ocular inflammation. Her comorbidities included dilated cardiomyopathy of unclear etiology (recovered), tuberculous lymphadenitis (treated) with mycotic pseudoaneurysm of the left common iliac artery requiring bypass, and provoked DVT (treated). During pregnancy, she developed gestational diabetes, and gestational hypertension superimposed on her chronic hypertension and was closely monitored for development of preeclampsia. Dose escalation of labetalol was limited by symptoms of fatigue and light-headedness. Aspirin was continued throughout the pregnancy. There was no flare of her TAK during pregnancy. She delivered at 37+3 weeks via scheduled caesarean section for complete anterior placenta previa with a marginal cord insertion. Her IUD was also removed with delivery. Postpartum, she required inpatient monitoring for hypertension and was discharged on oral antihypertensives. She was treated with DVT prophylaxis for six weeks postpartum given her history of a DVT post-surgery. Both mother and baby were doing well in follow-up.

Conclusion: Obstetrics, obstetrical cardiology, nephrology, vascular surgery, and rheumatology were all involved in her peripartum care, emphasizing the importance of a multidisciplinary approach to pregnancy management in TAK patients.

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An Unusual Presentation of ANCA-negative Granulomatosis With Polyangiitis (GPA) in the Gynecological Tract

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Background: Granulomatosis with polyangiitis (GPA) is a small and medium vessel vasculitis that generally manifests in the upper and lower respiratory tracts and kidneys but can less frequently be seen in other organ systems. Approximately 10% of patients with GPA have negative Anti-Neutrophil Cytoplasmic Antibody (ANCA) titres. As per the Canadian Vasculitis Learning Initiative (CAVALI), ANCA is detectable in 90% of patients with systemic GPA (generalized or severe) and 70-80% of those with limited GPA (localized or non-severe).

Case Presentation: We herein report an unusual case of ANCA-negative systemic GPA that presented in the gynecological tract. The patient underwent total abdominal hysterectomy and salpingo-oophorectomy for an adnexal mass, and post-operatively developed hypoxia and acute hemoptysis in the context of resolved leukocytoclastic vasculitis, chronic sinusitis, membranous nephropathy (but not glomerulonephritis), and negative

ANCA titres. Diagnosis and acute management of systemic GPA could not be established until the tissue pathology showed medium vessel vasculitis in the uterus, cervix, fallopian tubes and ovaries. We subsequently reviewed the literature on Ovid Medline and Pubmed using the search terms 'gyne' and 'vasculitis'. We identified ten case reports of gynecologic involvement of GPA; all had positive ANCA titres. Seven cases presented in the cervix alone (4-10), one in the cervix and upper vagina (2), one in the vagina (1) and one in the cervix and ovary (3). Six patients had a known diagnosis of systemic GPA prior to gynecologic presentation (2, 6-10), three patients presented with concomitant gynecologic and systemic manifestations (3-5) and one presented with limited GPA in the urethra and vagina (1).

Conclusion: This patient example is therefore unique as presentation of GPA in the uterus and fallopian tube has not previously been described and the negative ANCA made diagnosis and acute management of severe GPA even more challenging.

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Use of Hyperbaric Oxygen Therapy in Vasculitis Wounds: A Case Report and Review of Literature

Angela Hu (University of Toronto, Toronto)

Background: Vasculitis lesions can require complex management and often a multidisciplinary approach. One emerging area of research is the use of hyperbaric oxygen therapy (HBOT). Here we present a challenging case at our centre that required use of HBOT, along with a literature review on the evidence surrounding use of HBOT for vasculitic skin lesions.

Case Presentation: Ms. C is a 55 year-old woman who presented with erosive lesions on her lower legs for five years. In September 2018 she was referred to both rheumatology and dermatology for assessment of worsening, ulcerating lesions. A skin biopsy revealed leukocytoclastic vasculitis. Workup included negative ANA, ANCA, hepatitis B and C, and HIV. She had reduced C4 levels (0.03g/L) and cryoglobulin testing showed 6% cryocrit. She was started on oral prednisone 20mg daily, along with methotrexate 20mg weekly. She subsequently sought care in India where the lesions were debrided in January 2019. In April 2019 the ulcers were worsening still; methotrexate was discontinued, and azathioprine started. In May 2019, the lesions and associated pain were significantly increasing, thus she was admitted to hospital for systemic management of idiopathic cryoglobulinemic vasculitis. High dose prednisone (50mg) was started, along with cyclophosphamide 75mg daily. An MRI was done to rule out osteomyelitis, and plastic surgery team was also consulted who felt that debridement would not be beneficial. A consultation for HBOT was requested, and she began treatment for a total of 40 sessions. Overall the patient tolerated this well and experienced significant wound healing (pictures to be included) along with decreased pain.

Conclusion: The premise of HBOT is that it delivers supraphysiologic concentrations of oxygen to tissue, at 2-3 atmospheres pressure. In chronic wounds, there is lower partial pressure of O2 that impairs collagen synthesis and phagocytic activity, leading to poor wound healing. Much of the evidence for HBOT is in non-vasculitic processes, including crush injuries, compromised grafts, chronic osteomyelitis. A single study published by Efrati et al. (2006) specifically evaluated HBOT for non-healing vasculitic ulcers and included 35 patients. From this study, 80% had complete healing and 11% partial healing. HBOT has also been studied in chronic pain syndromes and showed beneficial results in primary outcomes (tender point count, pain threshold, functional impairment). While HBOT is not indicated for everyone and also has its' own complications, it may have a role for chronic, non-healing vasculitis lesions and further research is needed in this area.

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Biopsy-positive Versus Negative Giant Cell Arteritis: Clinical Presentation, Predictive Factors and Effect of Extra-long Biopsy Length

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Objectives: Giant Cell Arteritis (GCA) is a granulomatous arteritis typically affecting the aorta and/or its major branches, including the temporal artery. Temporal artery biopsy (TAB) is the gold standard to diagnose GCA; however, a negative biopsy does not exclude GCA. Whether patients with a positive TAB present differently than those without remains uncharacterized in the Canadian population. There have been conflicting studies on the effect of length of biopsy on positivity, with average biopsy lengths under 2 cm. Our study aimed to determine if patients with positive TAB present differently than those with negative biopsy and if extra-long biopsy length over 3 cm increases the likelihood of positive biopsy.

Methods: Retrospective chart reviews of patients diagnosed with GCA by a rheumatologist who underwent a TAB between 2000 and 2016 were performed. Extracted data included sex, age, biopsy result, TAB length, duration of glucocorticoid use and cumulative glucocorticoid dosage prior to biopsy. Descriptive statistics and frequencies were determined for outcomes by biopsy group (negative versus positive and proportion of patients with a biopsy length above 3 cm were compared between groups.

Results: Included in the analyses were 199 patients; 137 female (68%), mean (SD) age 73.1 (11.8) years. Biopsy- proven GCA was confirmed in 89 patients (45%). Mean (SD) TAB lengths were virtually equivalent between biopsy-positive 3.21 (2.6) cm and biopsy-negative 3.18(2.7) cm groups. These group differences were not significant. There were apparent differences between biopsy-positive versus negative in the proportions of patients with scalp tenderness (65% vs 55%), jaw claudication (65% vs 33%), temporal artery abnormalities on exam (57% vs 47%) and vision loss (38% vs 23.9%). The proportion of TAB positive patients with a biopsy length over 3 cm was 41.6%, compared to 33.6% for TAB negative group.

Conclusion: In examining patients with GCA, there appeared to be a higher proportion of individuals with a positive TAB with scalp tenderness, jaw claudication, and visual symptoms than with a negative TAB. Interestingly, the average ESR of patients in both groups was similar, whereas the average CRP in the patients with biopsy-positive GCA appeared higher. There was a slightly higher proportion of patients with a positive biopsy who had a biopsy length over 3 cm. Future directions include determining if longer TAB lengths increase positivity rate in patients with lower ESR and CRP levels or with a low pre-test probability for GCA.

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Saccular Aneurysms of Unknown Origin

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Background: Most abdominal aortic aneurysms are invariably associated with atherosclerotic damage of the aortic wall. However, saccular aneurysms, which contain only part of the aortic circumference, have an array of infectious and rheumatic etiologies.

Case Presentation: Here, we present an interesting case of a 33-year-old Indigenous female from Saskatchewan with a large-vessel vasculitis and multiple saccular aneurysms. She had a past medical history significant for a surgically-corrected congenital heart disease, dextrocardia, and tuberculosis (TB) and was admitted to Royal University Hospital in Saskatoon for congestive heart failure on three occasions between March and August of 2019. She underwent a CT angiogram as part of her cardiac investigations, which incidentally showed a left ventricular aneurysm and circumferential thickening of the aorta, right brachiocephalic, left common carotid, and left subclavian arteries suggesting a large-vessel vasculitis. These findings were confirmed on a PET-CT, which also revealed generalized granulomatous lymphadenopathy. Rheumatology was consulted to investigate her large-vessel vasculitis. She endorsed a history of fevers, night sweats, and generalized malaise and denied peripheral claudication. On exam, blood pressure and pulses were equal in both arms and she did not have bruits. She had a

positive Interferon Gamma Release Assay (IGRA) but bronchoscopy was negative for TB. An autoimmune panel was positive only for anti-smooth muscle antibody. She had consistently high immunoglobulins with elevations in subtypes IgG4 and IgG1. A CT angiogram was repeated, showing 3 new infrarenal saccular aneurysms measuring 2.3 x 3.6 cm, 1.3 x 1.3 cm, and 0.9 x 0.5 cm. Finally, although she was already on treatment for latent TB following the positive IGRA, a CT brain showed an area of gliosis, which, in the setting of granulomatous lymphadenopathy, is most consistent with active TB disease. On the basis of her large-vessel vasculitis, saccular aneurysms, and active TB, she was diagnosed with TB vasculitis and subsequently started on isoniazid, ethambutol, and rifampin. This led to improvement in her symptoms and a reduction in all inflammatory markers. At the time of her discharge she was in stable condition.

Conclusion: This case highlights the diagnostic uncertainty brought about by an unusual presentation of TB, a relatively prevalent disorder in Saskatchewan. There are several etiologies for saccular aneurysms including acute and chronic infections such as TB, Takayasu arteritis, IgG4-related disease, trauma, and connective tissue disorders, We hope this intriguing case will remind clinicians to take pause when confronted with this uncommon vascular phenomenon.

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Sicca Syndrome as a Rare Clinical Feature of Systemic AL Amyloidosis
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Background: Amyloid light-chain (AL) amyloidosis is a systemic disease in which misfolded immunoglobulin-derived light chain proteins infiltrate various tissues, most commonly affecting the kidneys and heart. In rare cases, the lacrimal and salivary glands can be involved, leading to sicca syndrome presenting as xerostomia and xerophthalmia.

Case Presentation: Here we present a case of a 71-year-old female with an 8-month history of profound xerostomia, blurred vision, chest tightness, and dyspnea on exertion. She was admitted to hospital for further investigation following an outpatient echocardiogram that showed advanced diastolic dysfunction and severe concentric remodeling suggestive of an infiltrative process. Further work-up revealed an abnormal kappa-to-lambda ratio of 0.07 and urine albumin to creatinine ratio of 3.5. CBC, creatinine, SPEP, and UPEP were normal. Cardiac MRI suggested amyloidosis. She underwent an endomyocardial biopsy, for which Congo red staining was negative for amyloidosis. However, amyloid fibrils were visualized through electron microscopy, establishing a diagnosis of cardiac amyloidosis. A bone marrow biopsy of her right iliac crest demonstrated 15% of clonal plasma cells consistent with plasma cell neoplasm. The presence of these two findings confirms the diagnosis of systemic AL amyloidosis associated with multiple myeloma. The patient attended a rheumatology clinic for further work up of her pronounced sicca symptoms. She denied gritty eye sensation. Examination revealed submandibular gland enlargement, macroglossia, and inadequate salivary pooling. Investigations including: ANA, ENA, anti-SSA and SSB, ANCA, RF, and CRP were negative. With the infiltrative disease process in the context of negative antibodies, it is thought that her sicca symptoms were a manifestation of amyloidosis. However, a salivary gland biopsy was never performed. Cardiac amyloidosis confers a very poor prognosis and, unfortunately, she passed away soon thereafter.

Conclusion: Approximately six published cases have reported AL amyloidosis manifesting as sicca syndrome. However, our case is unique in that one of the first reported cases describing immunologic-negative sicca syndrome as a primary presenting complaint for systemic AL amyloidosis associated with multiple myeloma. The presence of sicca syndrome without anti-SSA and SSB antibodies should prompt investigation for infiltrative processes, such as AL amyloidosis, and may assist in earlier detection of these diseases.

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Changes in Antiphospholipid Antibody (aPL) Status Over Time

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Objectives: There is limited data on how aPL status changes over the course of SLE. We assessed lupus anticoagulant (LAC), anticardiolipin (aCL), anti-β2-glycoprotein-1 (anti-β2GP1),anti-phosphotidylserine/prothrombin complex (aPS/PT), and anti-β2GP1-domain 1 (anti-β2GP1-D1) over time.

Methods: Patients fulfilling ACR/ SLICC Criteria for SLE were enrolled in the University of Calgary Lupus Cohort. Annual serum samples were analyzed for LAC using tissue thromboplastin inhibition test/dRVVT, for aCL (IgG), anti-β2GP1 (IgG), and aPS/PT (IgG/IgM) by ELISA, and for anti-β2GP1-D1 by chemiluminescence immunoassay.

Results: Among 271 patients (90.1% female; mean age at diagnosis 36.4 years; mean disease duration 13.3 years; 59% Caucasian, 22% Asian; average follow up 3.6 years), 14% were ever positive for LAC, 14% for aCL, 14% for anti-β2GP1, 40% for aPS/PT IgG or IgM, and 9% for anti-β2GP1-D1; 8% were ever triple-positive. Among patients providing at least 2 samples, 31/207 (15%) were ever positive for LAC, 29/212 (14%) for aCL, 26/202 (13%) for anti-β2GP1, 40/165 (24%) for aPS/PT IgG, 58/165 (35%) for aPS/PT IgM, and 11/132 (8%) for anti-β2GP1-D1. Among the 31 with ever positive LAC, 23% remained positive, 55% were initially positive and became negative, and 23% were initially negative and became positive. Among the 29 with ever positive aCL, 10% remained positive, 31% were initially positive and became negative, and 59% were initially negative and became positive. Among the 26 with ever positive anti-β2GP1, 38% remained positive, 15% were initially positive and became negative, and 46% were initially negative and became positive. Among the 40 with ever positive aPS/PT IgG, 50% remained positive, 30% were initially positive and became negative, and 20% were initially negative and became positive. Among the 58 with ever positive aPS/PT IgM, 47% remained positive, 28% were initially positive and became negative, and 26% were initially negative and became positive. Among the 11 with ever positive anti-β2GP1-D1, 45% remained positive, 36% were initially positive and became negative, and 18% were initially negative and became positive.

Conclusion: aPL status fluctuated over time. Although the majority of patients that were initially negative remained negative, 32% of these subsequently developed a positive aPL. The majority with an initial positive LAC or aCL did not remain positive, whereas the majority with an initial positive anti-β2GP1, aPS/PT IgG/IgM, or anti-β2GP1-D1 remained positive. Further research is needed to determine the effect of persistent versus transient aPL positivity on thrombosis/pregnancy morbidity.

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Lupus Choroidopathy - A Rare Manifestation of SLE
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Background: The educational points we are hoping to achieve through this case are to review the ocular manifestations of SLE, and discuss diagnosis and treatment of them.

Case Presentation: The patient is a 48-year-old male who has a long-standing history of Systemic Lupus Erythematosus. He initially presented with arthritis, Raynaud's phenomenon, malar rash and nephrotic syndrome (24-hour urine revealed 12 grams of protein) in 2008. His serology revealed a positive ANA 1/320, speckled pattern, positive DNA antibody, Ro positive, RNP positive, Smith positive, and low complements. His renal biopsy showed class 4 and 5 nephritis and he was treated with intravenous cyclophosphamide (cumulative dose 8 grams), and prednisone for induction followed by Cellcept and Plaquenil for maintenance therapy. Starting late 2009, he had blurry vision in his right eye and was diagnosed with Lupus retinal vasculitis. He was initially treated with intra-ocular Kenalog injections by Ophthalmology and was doing well. The patient's Cellcept was

discontinued in 2013 after he remained in clinical remission for several years. Unfortunately, he had a lupus nephritis flare in 2014 and was treated with Cellcept and prednisone. Repeat renal biopsy at that point showed focal proliferative lupus nephritis (class 3). His renal function remained stable and he continued therapy with Cellcept, low dose prednisone and Plaquenil. In 2018 his complement levels were decreasing, and he complained of reduced visual acuity and blurry vision in his right eye. Eye examination by a retinal specialist showed Lupus Choroidopathy. Given that this is a rare manifestation of SLE, there is scarce literature to guide clinical management. After we conducted a literature review, we found that Rituximab was shown to be a potentially useful agent in such cases. This was evidenced by a case series published from Harvard medical School in 2017. The case series had 6 patients with auto-immune retinopathy, one of which had a diagnosis of SLE. Patients received either Rituximab monotherapy or combination therapy consisting of Rituximab along with Bortezomib and/or Cyclophosphamide. After discussion with Ophthalmology, our patient was treated for Lupus choroidopathy using Rituximab. We used one gram monthly for two months. After his second infusion we observed subjective and objective evidence of dramatic improvement in his Lupus choroidopathy. He remains in remission and under close clinical surveillance.

Conclusion: Retinal vasculitis and choroidopathy are rare manifestations of Lupus. Diagnosis is often delayed and usually requires a retinal specialist to make the diagnosis.

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Low Lupus Disease Activity State (LLDAS) and Adverse Pregnancy Outcomes in Women with Systemic Lupus Erythematosus (SLE)

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Objectives: Prior data suggest conception in remission helps optimize pregnancy outcomes in SLE, but there is currently no generally accepted disease activity target before pregnancy. Treat-to-target endpoints, such as the Low Lupus Disease Activity State (LLDAS), have been shown to predict damage accrual and flare. However, to date, no study specifically assessed LLDAS and pregnancy outcomes. We evaluated if patients with LLDAS pre-conception had fewer adverse pregnancy events.

Methods: From January 2000 to June 2019, we assessed incident female SLE patients at their annual McGill Lupus Cohort study visits, identifying all pregnancies from enrolment onward. Women were allowed to contribute data from more than one pregnancy. Each pregnancy was considered individually, excluding fetal deaths before 20 weeks gestation and induced abortions. In each case, we determined the presence of LLDAS at the study visit prior to conception. LLDAS was defined as follows: SLE Disease Activity Index-2K $\leq$ 4 with no new activity, physician global assessment $\leq$ 1, prednisone $\leq$ 7.5mg/day, and standard immunosuppressive therapies. We evaluated adverse pregnancy outcomes, including fetal death after 20 weeks, gestational hypertension, preeclampsia, eclampsia, small for gestational age (SGA), and preterm birth. We summarized key clinical characteristics of these pregnancies, including maternal age, prior lupus nephritis, and presence of antiphospholipid antibodies (aPL).

Results: We identified 27 SLE women with 51 pregnancies over the study interval. Mean time from study visit to conception was 32 weeks (standard deviation, SD, 23 weeks). Out of these 51 pregnancies, 41 (80.3%) achieved LLDAS at the study visit prior to conception. Over one-third (15/41, 37%) of LLDAS pregnancies had prior nephritis versus 1/10 (10%) in the other group. Two of the LLDAS pregnancies had prior aPL (versus none in the other group). Mean maternal age was similar between both groups (31 years SD 4 in the LLDAS group versus 36 years SD 5 in the other group). Among pregnancies conceived in LLDAS, 11/41 (27%) had at least one adverse pregnancy outcome (2 preeclampsia, 4 preterm births, 1 SGA, and 6 fetal deaths) versus 1/10 (10%) of pregnancies not in LLDAS

(1 fetal death). The 17% difference in the two groups was not statistically significant (95 % confidence interval for the difference in proportions -21, 36%).

Conclusion: We were unable to demonstrate that LLDAS results in fewer adverse pregnancy outcomes due to small sample size and imbalance in important potential confounders. This highlights the need for larger studies to validate a treat-to-target endpoint prior to conception.

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Exploratory Factor Analysis of a Comprehensive Neuropsychological Battery in Assessing Cognitive Impairment in Systemic Lupus Erythematosus

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Objectives: Systemic Lupus Erythematosus (SLE) can lead to a number of neuropsychiatric manifestations including cognitive impairment (CI). The current gold standard test for assessment of cognitive performance in Systemic Lupus Erythematosus (SLE) is the American College of Rheumatology comprehensive neuropsychological battery (NB), consisting of 19 individual tests and 6 domains. The primary aim of our study was to explore the number of latent factors that constitute the NB and to determine if identified latent factors can be mapped to known cognitive domains assessed by the NB.

Methods: Consecutive consenting patients aged 18-65 years, attending a single center were enrolled (Jul 2016 – Mar 2019). The NB was administered for each patient. The NB includes evaluation of multiple cognitive domains through the following tests: Finger tapping, Trail Making Test A and B, Stroop Color and Word Test, Rey-Osterrieth Complex Figure Test, Controlled Oral Word Association Test, Animal Naming, Hopkins Verbal Learning Test – Revised, Wechsler Adult Intelligence Scale Digit Symbol Substitution Test and Letter-Number Sequencing, Consonant Trigrams. Exploratory factor analysis (EFA) was performed to determine the structure and number of factors that constitute the NB. The EFA used squared multiple correlations as prior communality estimates. A multiple imputation model was used to account for missing data. The sample size met standards for EFA of more than 100 participants or 10 times the number of variables being analyzed.

Results: 279 patients were included in the study, 89.6% were female. The median age at enrollment was 40.5 (interquartile range 30.5-51.6) and median disease duration 12.3 (Interquartile range 6.0 -21.6) years. 36 (12.9%) of patients had at least one test score missing. EFA model fitting indicated a six-factor model as the best fit with Akaike Information Criterion (AIC) -14 and Tucker and Lewis Reliability Coefficient 96% comparing to models with less or more factors. The choice of model was confirmed with Scree and Variance explained plots with cumulative variance of 100% explained by six factors. Individual NB tests loading on each factor were related to discrete cognitive domains with a similar distribution of tests into different factors reflecting the same domains of the current NB – manual motor speed, simple attention and processing speed, visuospatial construction, language processing, executive functioning, learning and memory.

Conclusion: EFA indicates a six-factor model can fit the structure of the

NB into separate cognitive domains. The factors identified by EFA closely resemble the current structure of NB and confirms its structural validity.

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SLE Presenting as Neck Mass

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Background: Laryngeal lupus was first described in a case report by Scarpelli et. al., published in NEJM in 1959. In 1992, Teitel et. al. published the largest literature review and case series of 97 patients with laryngeal involvement with SLE, outlining 9 manifestations: inflammatory mass, mucosal inflammation, infection, vasculitis, subglottic stenosis, cricoarytenoid arthritis, vocal cord paralysis, nodules, and epiglottitis.

Case Presentation: Here we present a case of SLE presenting with an asymmetric neck mass, found to be acute on chronic inflammation of the glottic soft tissue. A 39 year-old man presented to hospital febrile, post a syncopal episode secondary to decreased oral intake over 2 months. His presentation was precipitated by 2 months of chronic pharyngitis, dysphonia and progressive odynophagia due to rapidly enlarging left neck mass. This coincided with symmetric polyarthritis of the hands, wrists, knees, ankles and feet. One month prior to presenting, he developed a persistent purpuric rash on his arms and legs. Investigations revealed DAT positive hemolytic anemia, lymphopenia, thrombocytopenia, hypoalbuminemia, microscopic hematuria and proteinuria without casts, hypocomplementemia, elevated inflammatory markers (ESR 54, CRP 12.8), ANA 1:2560 cytoplasmic, homogenous and speckled, dsDNA over 30,000 kIU/L, positive Anti-RNP, -RNP-A, -RNP-68, -Sm, and -Chromatin. CT imaging of the neck showed profuse asymmetric edema with narrowing of the upper airway across the midline in the supraglottic region of the larynx with heterogenous soft tissue enhancement 2x2 cm at the level of the left vocal cord. Biopsy of the left glottis showed moderate to heavy non-specific acute on chronic inflammation (neutrophils, macrophages, T lymphocytes, a few B cells and plasma cells) with weak basement membrane zone staining for IgA, IgG, and IgM. Negative for C3, fibrin, EBV, CMV, HSV I and II, fungal hyphae, IgG4, and malignancy (CK AE1/AE3 and p40). He was treated with dexamethasone 10 mg iv followed by 4 mg q6hours for 8 days, then transitioned to oral prednisone 30 mg OD, as the mass responded to steroids and he was able to swallow. He was started on methotrexate 20 mg PO q1week (due to severe needle phobia), hydroxychloroquine 400 mg PO OD, and adjunctive PJP prophylaxis and bone protection. Duration of hospitalization was 10 days.

Conclusion: An inflammatory laryngeal mass is an uncommon presentation of SLE. Any patient with a clinical picture of SLE with upper airway symptoms warrants assessment by laryngoscopy. Biopsies of inflamed glottic tissue assist to rule out indolent infection or malignancy.

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Application of the Systemic Lupus Erythematosus (SLE) Quality Indicators in Patients Attending a Young Adult Transition Program

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Objectives: Childhood-onset SLE (CSLE) constitutes approximately 15% of all SLE diagnoses and, when compared to adult-onset disease. Quality indicators (QIs) for SLE have been proposed for adult-onset disease, focused on health maintenance and management of disease- and treatment-related morbidity. These, in turn, may serve as proximate surrogates for longer-term SLE-associated outcomes. The literature reveals that these are performed sub optimally in virtually every clinical setting studied, citing time constraints, forgetfulness, and more pressing issues to address. In efforts to ascertain whether the optimal quality of care is being delivered to these at-risk cSLE patients, and with a view to tailoring Quality Improvement interventions that would be most impactful, we measured the consistency with which five SLE Qis were applied in a young adult transition cohort compared to routine care.

Methods: A comprehensive chart review of all patients attending a young adult SLE transition clinic at a single, tertiary care site was conducted. The three most recent visits were reviewed. Binary data were abstracted from each chart to determine whether there was documentation of sun avoidance counseling, annual influenza vaccine counseling, bone health screening, and anti-malarial-associated ophthalmologic screening, over the visits abstracted. The data were then compared with patients attending the clinics of the two physicians who see the majority of lupus patients at the same institution. Suboptimal adherence was defined as less than 80% in any of the five quality indicators and a difference of < 35% was treated as comparable between the two groups.

Results: A total of 16/57 (28%) patients were counseled regarding sun avoidance. Out of 32 patients on immunosuppressive therapy; 15 (47%) had annual influenza vaccine counseling and none (0/32) received pneumococcal vaccination. Of patients at risk of osteoporosis; 64% underwent BMD testing. Among patients receiving antimalarials; 43/56 (76%) had their eye exam up to date. The comparator group had a comparable rate in sun avoidance counseling (0%), pneumococcal vaccine (12%) and HCQ-associated eye screening (50%) and worse in annual influenza vaccine (20%) and osteoporosis screening (25%).

Conclusion: The Young Adult Transition Program is adhering sub optimally to the five reviewed QIs, as has been demonstrated in studies at other institutions. Efforts to improve uptake of these QIs will be undertaken, with Quality Improvement interventions driven by the results of a root cause analysis for each QI.

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Wait Times for Rituximab Infusions at the Medical Outpatient Unit: A Quality Improvement Study

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Objectives: The use of Rituximab is rapidly increasing, and this medication is now prescribed by several medical subspecialties. The demand for Rituximab, coupled with its long infusion times has led to significant patient wait times for outpatient treatment. In this quality improvement study, the objectives were to: conduct a focus group to identify issues with the current system, create and conduct a formal survey to determine patient satisfaction with their care, and conduct a Gemba walk of the outpatient facility.

Methods: The setting of this study was the Medical Outpatient Unit (MOU) at the University of Alberta Hospital. First, a focus group was completed that surveyed multidisciplinary MOU health care professionals, including nursing staff, pharmacists and physicians for problems with the Rituximab infusion process. To build understanding, an affinity analysis was completed and used to generate a cause and effect diagram (fishbone). A Gemba walk of the medical outpatient was conducted that followed two patients receiving Rituximab infusions, to identify any common delays to the infusion process. Finally, a patient survey was co-developed with key stakeholders that focused on patient's overall satisfaction with the outpatient infusion process and their expectations prior to receiving their treatment.

Results: The results of the focus group identified three main areas increasing wait times for Rituximab infusions: difficulties in medication financial coverage approval, errors in the Rituximab order set and difficulties scheduling patients due to variable infusion chair time. The results of the Gemba walk indicated a significant delay to MOU efficiency with patients not arriving at the scheduled appointment time. Other, inefficiencies identified by the Gemba walk were wait times for the pharmacy to prepare the infusion and limited staffing availability. The patient survey is still being implemented and the results have not yet been compiled. Finally, the Rituximab order set has been updated for implementation into ConnectCare for launch in November 2019. Updates to the Rituximab order sets included a standardized process to deal with infusion reactions (moderate to high severity), and standardized orders across subspecialties.

Conclusion: Overall, this study identified key problems with the outpatient Rituximab infusion process which has led to direct improvements of the process

efficiency. In the future, this study may improve patient care by providing timely access to treatment. As more patients require use with Rituximab, ensuring a standardized approach is necessary. Next steps will be to integrate patient results to improve the patient journey with Rituximab usage.

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Clinical Efficacy of Various Diets, Vitamins, and Supplements in Rheumatoid Arthritis: A Meta-Analysis

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Objectives: To evaluate the efficacy of various diets, vitamins, supplements, herbal remedies, and fatty acids on clinically relevant outcomes in adult patients with rheumatoid arthritis.

Methods: We systematically reviewed EMBASE and MEDLINE electronical databases from inception until Feb 23, 2019 for relevant articles. Only randomized controlled trials which assessed oral, non-pharmacological interventions (e.g. diets, vitamins, oils, herbal remedies, fatty acids, supplements, etc.) in adult patients with rheumatoid arthritis (RA), that presented clinically-relevant outcomes (defined as pain, fatigue, disability, joint counts, and/or disease indices) were included in our meta-analysis.

Results: A total of 4423 unique articles were independently assessed by two authors, of which 71 were included in our meta-analysis. Pooled random effects models from 7 trials (total patients (N) = 759) suggested Vitamin D supplementation improved DAS28 scores (mean difference (MD) = -0.41, 95% confidence interval (CI) = -0.67 to -0.15; p = 0.002) and Health Assessment Questionnaire (HAQ) scores (MD = -0.10, 95% CI -0.16 to -0.04; p = 0.001) in patients with RA. Fatty acids were the most studied intervention, totaling 23 trials. Four of these studies (N = 176) compared high dose omega-3 fatty acids to placebo and showed evidence of increased ACR20 responses (pooled relative risk ratio = 2.61, 95% CI = 1.54-4.43; p < 0.001).

Conclusion: Overall, very few interventions were studied more than once: only curcumin, vitamin D, vitamin E, gamma-linoleic acid, omega-3 fatty acids, and three different diets had more than one trial which reported clinical outcomes. Unfortunately, many identified studies were hindered by design flaws and even more by inadequate reporting of data. However, there was moderate evidence that high-dose Vitamin D supplementation and omega-3 fatty acids improved some clinical outcomes in patients with rheumatoid arthritis. Further clinical trials that are well-designed, fully-powered, and sufficiently report American College of Rheumatology improvement criteria or European League Against Rheumatism response criteria outcomes are needed to confirm the efficacy of many supplements and diets in RA.

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Modified Disease Activity Score at 3 Months is a Significant Predictor for Rapid Radiographic Progression at 12 Months Compared with Other Measures

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Objectives: Progressive rheumatoid arthritis (RA) is responsible for joint damage causing disabilities with no agreement on which disease measures best predict radiographic progression. We aimed to determine which disease activity measures including disease activity score (DAS), modified (M) DAS28 (CRP), clinical disease activity index (CDAI), and health assessment questionnaire disability index (HAQ-DI) best predict rapid radiographic progression (RRP) in early RA patients at baseline (BL) and 3 months.

Methods: PREMIER data, a 2-year, multicenter, double-blind active comparator-controlled study with methotrexate (MTX) naïve RA patients and active disease < 3 years, were used. Only patients in the MTX arm were analyzed. RRP was defined as change in modified total Sharp (mTSS) more than 3.5 at month 12. Logistic regression analysis assessed impact of measures at BL and 3 months on RRP at 12 months. Best cut-off points of M-DAS28(CRP) was also estimated using area under the receiver operating characteristic curve.

Results: 149 patients were included: female (n = 113; 75.8%), positive RF (n = 127; 85.2%), mean (SD) age 52.9 (13.3) years, disease duration 0.8 (0.9) year, DAS28(CRP) 6.3 (0.9). After adjusting for potential confounders, only M-DAS28(CRP) at BL (adjOR = 3.29; 95% CI: 1.70-6.36) and 3 months (adjOR = 2.56; 95% CI: 1.43-4.56) strongly predicted RRP at 12 months. M-DAS28(CRP) 4.5 and 2.6 at BL and 3 months maximized sensitivity and specificity for prediction of RRP.

Conclusion: M-DAS28(CRP) was a stronger predictor at BL and 3 months for RRP compared with other disease activity measures. Removing tender joint count and patient global assessment from DAS28(CRP) improves prediction of RRP.

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Time to Discontinuation of Tofacitinib and TNF inhibitors in Rheumatoid Arthritis Patients with and without Methotrexate: Data from A Rheumatoid Arthritis Cohort

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Objectives: Tofacitinib (TOFA) is an oral, small molecule drug used for rheumatoid arthritis (RA) treatment and is prescribed alone or with methotrexate (MTX). Tofa can be used as an alternative to biologic disease modifying antirheumatic drugs (bDMARDs) including tumor necrosis factor inhibitors (TNFi). We aimed to evaluate the discontinuation rate of this drug, with and without concurrent MTX in comparison with TNFi, in patients with RA in the Ontario Best Practices Research Initiative (OBRI).

Methods: RA patients enrolled in the OBRI initiating their TOFA or TNFi (adalimumab, certolizumab, etanercept, golimumab, and infliximab) within 30 days prior to or any time after enrolment between 1st June 2014 (TOFA approval date in Canada) and 31st Dec 2018 were included. Time to discontinuation (due to any reason) was assessed using Kaplan-Meier survival (adjusted for propensity score using inverse probability of treatment weight) to compare patients with and without MTX use at initiation of TOFA or TNFi.

Results: A total of 565 patients initiated TOFA (n = 208) or TNFi (n = 357). Of those, 106 (51%) and 222 (62%) were treated with MTX in the TOFA and TNFi group, respectively and mean (SD) disease duration were 13.1 (9.4) and 9.5 (9.4) years. In the TOFA group, 86% were female and mean (SD) age at treatment initiation was 60.4 (10.6) years. In the TNFi group 82% were female and mean age (SD) at treatment initiation was 57.0 (12.6) years. The TOFA group was more likely to have prior biologic use (61.5%) compared with the TNFi group (31%). At treatment initiation, the mean (SD) clinical disease activity index (CDAI) was 24.8 (12.1) in the TOFA group and 21.8 (12.0) in the TNFi group. Over a mean of 17.3 months follow-up, discontinuation was reported in 75 (36%) and 103 (29%) of all TOFA and TNFi patients, respectively. After adjusting for propensity score, patients treated with TNFi and MTX remained on treatment longer than those treated without MTX (Logrank p = 0.002) while there was no significant difference in TOFA discontinuation in patients with and without MTX (Logrank p = 0.31).

Conclusion: In this real world data study, we found that TOFA retention is similar in patients with and without MTX, while patients treated with TNFi and MTX remained on treatment longer than those treated without MTX. Merging data with other RA registries in Canada is proposed to increase study power and to provide more robust results.

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Patient Disease Trajectories in Baricitinib-2mg-treated Patients with Rheumatoid Arthritis and Inadequate Response to csDMARDs

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Objectives: Baricitinib (BARI) is an oral, selective Janus kinase (JAK) 1/ JAK 2 inhibitor approved for the treatment of moderately to severely active rheumatoid arthritis (RA) in adults. In the RA-BUILD phase 3 trial, BARI-2mg demonstrated clinical efficacy in patients (pts) with RA and an inadequate response to conventional synthetic disease-modifying anti-rheumatic drugs (csDMARDs). The main objectives of this analysis were to assess the response patterns to BARI 2-mg in the RA-BUILD trial and, to describe the baseline clinical characteristics for pts within each response pattern. We also examined the longterm efficacy in each pattern group using RA-BEYOND (long term extension study) data.

Methods: Observed data from all BARI-2mg treated pts in the RA-BUILD trial (N = 229) up to 24 weeks; protocol mandated rescue, treatment discontinuation, or loss to follow-up were included in the analysis. A Growth Mixture Model was used to classify the longitudinal disease patterns based on the time course of clinical disease activity index (CDAI) from week 0 to week 24. Baseline characteristics and disease measures were described between groups. Long-term CDAI trajectory was examined for each group using observed data from RA-BEYOND.

Results: BARI-2mg treated pts were classified into 2 groups based on their CDAI trajectory patterns. Group 1 (n = 170, 74%) had lower baseline CDAI (mean = 33), achieved 52% improvement in mean CDAI at week 4 (change from baseline, ΔCDAI -17), 66% improvement at week 12 (ΔCDAI -22), and maintained similar pattern of improvement through 24 weeks (75%, ΔCDAI -25). Group 2 (n = 59, 26%) had higher baseline CDAI (mean = 46.5), achieved 19% improvement in mean CDAI at week 4 (ΔCDAI -9) with improvement at week 12 (29%, ΔCDAI -14) and week 24 (37%, ΔCDAI -17). During RA-BUILD and RA-BEYOND trials, 53% of pts (n = 90) were never rescued in group1 and their CDAI low disease activity maintained well.

Conclusion: There are two response patterns to BARI-2mg treatment in the RA-BUILD trial. The majority of BARI 2-mg treated pts (group 1, 74%) achieved good response with at least 50% improvement in CDAI by week 12. Response was observed as early as week 4 and continued to improve in this group through week 24. Long term efficacy was well maintained for group 1 pts. Those pts tended to be associated with less pain and better physical function at baseline.

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Impact of Comorbid Conditions on Patient Related Outcomes (PROs) after 12 Months of Treatment with Abatacept: Results from the Abatacept Best Care Real-World Study

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Objectives: Comorbidities are associated with poor clinical outcomes in rheumatoid arthritis (RA). The aim of this analysis was to assess whether patients with or without comorbidities evaluate PROs differently and to explore potential differences in response to open label abatacept treatment.

Methods: Abatacept Best Care (ABC) is a prospective, multicenter, study of patients with active RA starting subcutaneous abatacept. Baseline demographics and characteristics were compared between patients with or without comorbidities (defined as obesity, osteoarthritis, depression, infection, cancer, cardiovascular disease and diabetes). Baseline levels of PtGA, TJC28, pain, fatigue, and HAQ-DI were also compared between the two groups while adjusting for SJC28, ESR, age, and gender. The improvement

in each PRO from baseline to 12 months as well as the achievement of CDAI LDA or remission was compared between the two groups with general linear regression and logistic regression, respectively, adjusting for baseline levels of the respective PROs, SJC28, ESR, age, gender, disease duration, biologic exposure, and concurrent DMARD and prednisone use.

Results: 286 patients were included in the analysis, of whom 177 had one or prior comorbidities. At baseline, patients with comorbidities were older with a mean (SD) age of 61.6 (12.8) vs 56.3 (11.6), more likely to have been treated with a prior biologic (46.3% vs 30.3%) and have family history of RA (41.2% vs 30.3%). No statistically significant differences at baseline were observed between groups (in adjusted and unadjusted analyses) in disease activity (SJC28, MDGA, DAS28, and CDAI) or in PROs and patient expectations with treatment. At 12 months, patients with comorbidities experienced significantly lower improvements in CDAI (-16.6 ± 3.4 vs -21.3 ± 12.0, p = 0.01), PtGA (-16.7 ± 30.3 vs -26.1 ± 28.8, p = 0.03) and HAQ-DI (-0.3 ± 0.6 vs -0.5 ± 0.6, p = 0.006). Improvements in TJC28, pain and fatigue were numerically lower, but not statistically different. In multivariate analysis, patients with comorbidities showed significantly lower improvements in fatigue (-11.2 ± 4.8 vs -19.9 ± 5.3, p = 0.03) and HAQ-DI (-0.1 ± 0.09 vs 0.37 ± 0.1, p = 0.002). Lower improvement in PtGA, TJC28 and pain was observed but not statistically different. No significant differences between comorbidity groups were observed in achievement of CDAI LDA and CDAI remission.

Conclusion: The presence of comorbidities was associated with lesser improvement in PROs scores after 12 months of treatment with abatacept, despite no differences at baseline. Comorbidities may therefore affect the evaluation of PROs, when patients' disease activity has improved.

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Improvements in Fatigue Lags Behind Disease Activity in Early Rheumatoid Arthritis Patients in Sustained Remission

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Objectives: To examine the relationship between disease activity and fatigue over time in early rheumatoid arthritis (ERA). To determine the timing of maximal improvements in fatigue with relation to disease remission.

Methods: Data were from patients with ERA (symptoms ≤ 12 months) enrolled in the Canadian Early Arthritis Cohort (CATCH). CATCH participants completed repeat clinical assessments, laboratory investigations and self-reported questionnaires including rating their fatigue over the past week using a 10 point numerical rating scale (NRS). Patients were excluded if fatigue data was missing at baseline or 12 months follow-up. T-tests and repeated measures ANOVA were used to compare differences in fatigue in patient who did vs. did not achieve low disease activity (DAS28 < 3.2) within 3-months of cohort entry. Paired T-tests were used to compare fatigue in patients achieving remission (DAS < 2.8) at three or more consecutive visits within the first year of follow-up.

Results: Of the 1864 patients included, 1640 (88%) met ACR criteria for RA, 1342 (72%) were women and most had moderate-high baseline disease with a mean (SD) DAS28 of 4.9 (1.5). Fatigue was common with 19% reporting fatigue scores > 2 but < 5 and 59% reporting fatigue ≥ 5 at baseline. Patients who achieved DAS28 remission (REM) or low disease activity (LDA) within 3-months of cohort entry had significantly lower mean fatigue compared to those with more active disease throughout 5 years of follow-up (p < 0.001). There was significantly decreased fatigue

compared to prior visits at the time of achieving first DAS REM in patients with sustained remission for three or more consecutive visits in the first year (p < 0.001). In those who first achieved DAS REM at 6 months there was significantly decreased fatigue at both the 3 and 6 month follow-up. Once in DAS REM, there was a further significant decrease in fatigue 6 months after first DAS REM for those in sustained remission during the first year (p < 0.05).

Conclusion: Fatigue is common in ERA and is significantly decreased at time of first remission in those with sustained remission within the first year of diagnosis. Fatigue continues to improve in patients in sustained remission with significant improvement seen 6 months following first remission. Early treatment response within 3-months was associated with short and long-term improvements in fatigue over time.

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Prevalence of Renal Impairment in a US Rheumatoid Arthritis Population

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Objectives: This study used the Modification of Diet in Renal Disease (MDRD) equation to calculate the prevalence of estimated glomerular filtration rate (eGFR)-based renal impairment among US patients with rheumatoid arthritis (RA) in a commercially insured population, with the goal of providing current real-world data to inform RA treatment decisions in cases where such decisions may be impacted by chronic kidney disease (CKD).

Methods: Claims data from the HealthCore Integrated Research Database (HIRD®) from January 2013 through December 2018 were used. All adult patients with ≥ 2 claims with diagnosis codes for RA were included in the study, with index date set as the earliest occurrence of an RA claim. All patients had to have ≥ 2 serum creatinine (SCr) laboratory measurements ≥ 90 days apart on or after the index date. Prevalence of eGFR-based renal impairment by severity category (i.e., mild [eGFR 60-90 mL/min/1.73m2], moderate [eGFR 30-59 mL/min/1.73m2], and severe [eGFR < 30 mL/min/1.73m2]), was calculated based on the MDRD equation. Patients with conflicting severity categories based on their 2 SCr measurements were classified into the less-severe category. Possible variations in prevalence for patients on advanced therapies (biologic DMARDs or tofacitinib) were explored in subgroup analysis.

Results: There were 152,090 adult patients with RA identified in the HIRD®, with 128,062 (84%) meeting the inclusion criteria of the study. Of these, 42,173 (33%) had ≥ 2 qualifying SCr laboratory results and 16,197 (13%) also initiated advanced RA therapies. Mean age was 56 years; 76% of patients were female. In this population, the estimated prevalence of renal impairment by severity is approximately 52% for mild, 9% for moderate, and < 1% for severe. Prevalence was slightly lower among patients initiating advanced therapy (i.e., approximately 51% for mild, 7% for moderate, and < 1% for severe). Prevalence remained relatively consistent from 2013 to 2018.

Conclusion: Among commercially insured US adults with RA with ≥ 2 SCr results, approximately 7-10% of patients have moderate or severe CKD (eGFR < 60 mL/min/1.73m2) that might merit dose adjustment of RA medication. Prevalence in this population was stable from 2013 to 2018. While the reported prevalence of renal impairment may tend to underestimate true prevalence due to all patients being covered by commercial insurance, it highlights that renal monitoring, DMARD dose adjustment, and potential for drug toxicity remain important considerations for approximately 10% of RA patients.

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Patient Disease Trajectories in Baricitinib 2-mg-Treated Patients with Rheumatoid Arthritis and Inadequate Response to Biologic DMARDs

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Objectives: The objectives of this analysis were to assess the response patterns to baricitinib (BARI) 2-mg in the RA-BEACON trial and to describe the demographic and clinical characteristics for patients within each response pattern.

Methods: Observed data from all BARI 2-mg treated patients in the RA-BEACON trial (N = 174) up to 24 weeks, protocol-mandated rescue, treatment discontinuation, or loss to follow-up were included in the analysis. A Growth Mixture Model was used to classify the longitudinal disease patterns based on the time course of Clinical Disease Activity Index (CDAI) improvement from week 0 to 24. Baseline characteristics and disease measures were described between groups. The trajectories of HAQ-Disability Index (DI), pain, tender joint count (TJC), and swollen joint count (SJC) within each response pattern were also examined.

Results: BARI 2-mg treated patients were classified into 3 groups based on their CDAI trajectory patterns. Group 1 (n = 90, 52%) had lower baseline CDAI (mean = 34), achieved 53% improvement in group mean of CDAI at week 4 (change from baseline, ΔCDAI -18), 64% improvement at week 12 (ΔCDAI -22), and maintained similar improvement through 24 weeks. Group 2 (n = 29, 17%) had higher baseline CDAI (mean = 51), achieved 32% improvement in mean CDAI at week 4 (ΔCDAI -16) with greater improvement at week 12 (52%, ΔCDAI -27) and week 24 (66%, ΔCDAI -34). Group 3 (n = 55, 32%) had a baseline CDAI (mean = 52) similar to group 2, but had smaller improvement, achieving 18% improvement in CDAI (ΔCDAI -10) at week 24. The distributions of HAQ-DI, pain, TJC, and SJC within each response pattern showed a trajectory similar to the corresponding group CDAI trajectory. Compared to groups 1 and 2, group 3 had more pain, worse physical function (HAQ-DI), and a larger proportion of patients who used ≥ 3 bDMARDs at baseline.

Conclusion: There are three response patterns to BARI 2-mg treatment in the RA-BEACON trial. The majority of BARI 2-mg treated patients achieved good response (groups 1 and 2, 68%) with at least 50% improvement in CDAI by week 12. Response was observed as early as week 4 and was maintained or continued to improve in these groups through week 24. Patients with less response (group 3) tended to be more treatment experienced with more pain and worse physical function at baseline.

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Baricitinib 4mg and 2mg Once-Daily Reduced Pain in Both Patients Who Were Opioid Users and Non-users in Active Rheumatoid Arthritis: A Post-hoc Analysis of Phase 3 Trials

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Objectives: To assess pain reduction in opioid users and non-users with rheumatoid arthritis (RA), we tested the effect of (1) baricitinib (BARI) 4-mg, an oral JAK1/JAK2 inhibitor, vs. placebo (data pooled from RA-BEAM for

those with inadequate response [IR] to MTX, RA-BUILD for those with IR to conventional DMARDs, and RA-BEACON for those with IR to ≥1 tumor necrosis factor inhibitors), (2) BARI 2-mg vs. placebo (RA-BEACON), and (3) adalimumab (ADA) 40-mg vs. placebo (RA-BEAM).

Methods: Total number of opioid users/randomized patients were: 171/891 BARI 4-mg and 153/892 placebo in the pooled analysis, 54/174 BARI 2-mg and 58/176 placebo in RA-BEACON, and 34/330 ADA and 50/488 placebo in RA-BEAM. Pain was measured by Patient's Assessment of Pain visual analog scale (VAS, 0-100mm). Last observation before treatment discontinuation/rescue was carried forward through Week 24. ANCOVA model assessed differences in pain reduction at each time-point in the three groups. Baseline pain VAS, age, BMI, and trial were covariates in the model. Heterogeneity of treatment effect (active vs. placebo) was evaluated across opioid users and non-users by interaction test. Analyses were not adjusted for multiplicity.

Results: BARI 4-mg had greater pain reduction vs. placebo in opioid users and non-users ($P < 0.05$) at all time-points through Week 24. At Week 24, difference in pain VAS reduction between BARI 4-mg vs. placebo was -13.4 mm (95% CI: -19.0, -7.8) in opioid users and -14.3mm (-16.7, -11.9) in non-users (interaction $P = 0.8$). BARI 2-mg had greater pain reduction vs. placebo in both opioid users and non-users ($P < 0.05$) starting at Week 12. At Week 24, difference in pain VAS reduction between BARI 2-mg vs. placebo was -10.7mm (-19.5, -1.9) in opioid users and -8.3mm (-15.0, -1.6) in non-users (interaction $P = 0.8$). Pain reduction in BARI 4-mg and 2-mg vs. placebo was similar between opioid users and non-users at all time-points (interaction $P > 0.1$). In RA-BEAM, a significant difference in pain reduction was not observed for ADA vs. placebo in opioid users; whereas, for non-users, difference in pain reduction was observed for ADA vs. placebo at all time-points ($P < 0.05$). At Week 24, difference in pain VAS reduction between ADA vs. placebo was -4.9mm (95% CI: -16.4, 6.6) in opioid users and -12.2mm (-15.6, -8.9) in non-users (interaction $P = 0.2$).

Conclusion: Pain reduction was similar between opioid users and non-users with BARI 4-mg at all time-points and with BARI 2-mg vs. placebo from Week 12. In contrast, ADA did not result in pain reduction vs. placebo in opioid users.

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Efficacy and Safety of Upadacitinib Monotherapy in MTX-Naïve Patients with Early Active RA Receiving Treatment within 3 months of Diagnosis: A Post-Hoc Analysis of the SELECT-EARLY Trial

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Objectives: Upadacitinib (UPA), an oral, reversible, potent JAK-1 selective inhibitor demonstrated efficacy in patients (pts) with moderate to severely active RA who were MTX-naïve or had an inadequate response to csDMARDs/bDMARDs. The current analysis aims to present the efficacy and safety outcomes from a post-hoc analysis of patients who received treatment within 90 days from diagnosis in the SELECT-EARLY trial.

Methods: In SELECT–EARLY, MTX-naïve pts with active RA and poor prognosis were randomized 1:1:1 to once-daily UPA monotherapy at 15 or 30 mg or weekly MTX (titrated up to 20 mg/week through Week 8). Efficacy (including ACR, DAS28(CRP), CDAI responses and change in mTSS) and safety outcomes from a post-hoc analysis of patients who received treatment within 90 days from diagnosis are reported here. The statistical significance defined as $p < 0.05$ was exploratory in nature.

Results: Overall, 270 pts commenced treatment within 90 days from RA diagnosis (median: 44 days [11, 89]). Pts in each arm were mostly female (70%) and had moderately to severely active RA. At Week 24, compared to MTX, significantly greater proportions of pts receiving UPA 15 or 30 mg monotherapy achieved efficacy outcomes including ACR20, 50 and 70 responses, DAS28CRP < 2.6, CDAI ≤ 2.8 or Boolean remission. Improvements in physical function (HAQ-DI) and decrease in pain were also significantly greater in pts receiving UPA 15 and 30 mg vs MTX at Week 24. Treatment with UPA was also associated with a greater inhibition of structural joint damage compared with MTX. Safety outcomes were consistent with the full study and the integrated safety analysis (all phase 3 studies of UPA). Compared to MTX, higher frequencies of serious infections and herpes zoster were reported in both UPA groups. There were 2 deaths in total (UPA 30 mg: 1 due to cardiovascular death and 1 due to pneumonia and sepsis).

Conclusion: In RA pts, early initiation of treatment with UPA 15 mg and 30 mg monotherapy within 3 months from diagnosis was associated with clinically meaningful improvements in efficacy, including remission and inhibition of progression of structural joint damage compared to MTX. The safety profile was consistent with the overall study and the integrated phase 3 safety analysis. Thus, even in very early RA pts, who should be more responsive to treatment, UPA was more effective than MTX in enabling more patients to reach their treatment targets of remission or low disease activity when treated within 3 months of diagnosis. Top 10 Poster

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Patterns of Sustained Remission and Subsequent DMARD Tapering in Early Rheumatoid Arthritis: Data from the Canadian Early Arthritis Cohort

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Objectives: Rheumatoid arthritis (RA) treatment emphasizes aggressive titration of disease-modifying antirheumatic drugs (DMARDs) with the goal of achieving disease remission. This often includes the use of multiple DMARDs in combination, which can have a significant impact on patients' lives and add costs to the healthcare system. The objectives of our study are to describe the patterns of sustained remission and subsequent treatment reduction in usual clinical practice for patients with early RA.

Methods: Patients (age >18) enrolled in the Canadian early ArThritis CoHort (CATCH) between January 2007 to March 2017 were analyzed. CATCH is a prospective, observational study of patients with early inflammatory arthritis (symptoms < 1 year) treated in rheumatology clinics across Canada. The analysis cohort included patients with a diagnosis of RA according to the 1987 or 2010 ACR/EULAR classification criteria, active disease at enrolment (DAS28 > 2.6) and those treated with at least one DMARD or biologic agent within the first three months of study enrolment. We defined sustained remission as achieving a DAS28 < 2.6 at two consecutive follow-up visits at least six months apart. Reduction of therapy was defined as a minimum of a 25% dose reduction of conventional synthetic, targeted or biologic DMARDs. Descriptive statistics were used to summarize the time to remission and reductions in DMARD therapy.

Results: Eight hundred and thirty-seven (40%) of the 2,097 eligible patients achieved sustained remission during the study period. Of these, 60% did so within the first 18 months and 92% within the first four years. The mean (SD) baseline DAS28 was 5.1 (1.3), and HAQ-DI was 1.0 (0.7). At the time of remission, 80% were prescribed methotrexate (55% subcutaneously), 71% were prescribed combination therapy with other conventional synthetic DMARDs, and 13% were prescribed a biologic agent. In the year following sustained remission, 327 (39%) patients reduced treatment in the following pattern (patients may have had more than one change): 250 patients (30%) reduced or stopped methotrexate, 196 patients (23%) reduced or stopped non-methotrexate DMARDs, and 34 patients (4%) reduced or stopped biologic agents. Of those that reduced or stopped a biologic, only one was due to side-effects. For the 250 patients who reduced or stopped methotrexate, 25 were for a side-effect.

Conclusion: Achieving sustained remission occurred in 40% of early RA patients in usual clinical practice. Treatment reductions following sustained remission occurred in over a third of patients over the next 12 months and consisted mainly of adjustment in non-biologic DMARDs.

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Smoking, Race/ethnicity, and Interstitial Lung Disease in Incident Rheumatoid Arthritis

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Objectives: Rheumatoid arthritis (RA) associated interstitial lung disease (ILD) causes significant morbidity and mortality. Smoking and race/ethnicity are potential determinants of RA-ILD. We studied these factors in relationship to RA-ILD onset, using administrative health data from the United States.

Methods: Incident adult RA patients, without prior ILD, were identified from two non-linkable MarketScan databases. From the Commercial Claims and Health Risk Assessment (HRA) database (2010-2017, containing self-reported smoking data), we created a first cohort to study smoking and ILD. The Medicaid database (2011-2017) was used to study race/ethnicity and ILD. The RA case definition for both cohorts was based on ≥ 2 outpatient or >1 inpatient RA claim within 2.5 years. Incident ILD after RA diagnosis was identified using ≥ 2 outpatient/inpatient claims for ILD at least 1 month apart. Baseline smoking was defined as never, past, or current based on HRA survey before RA diagnosis. Available race/ethnicity categories were: Caucasian, African-American, Hispanic, or other. Baseline covariates were compared between those who developed ILD vs. did not, and included past chronic obstructive pulmonary disease (COPD), age, and sex.

Results: In the first RA cohort (N = 12,842), 75.3% were never smokers, 14.8% past smokers, and 9.9% active smokers at cohort entry. Baseline COPD prevalence was 3.6%. 187 (1.5%) RA patients developed ILD. In univariate analyses, there was no clear difference between RA patients that developed ILD, versus those that did not, aside from more baseline COPD among those developing ILD (7.0% vs 3.5%, difference of 3.5%, 95% confidence interval (CI) 1.0-8.0%). In the second RA cohort (N = 42,164), 54.5% were Caucasian, 31.4% African-American, 2.3% Hispanic, and 11.7% other race/ethnicity. This cohort was older and slightly more male than the first RA cohort, with more baseline COPD (16.2%). 904 (2.1%) patients of the second RA cohort developed ILD. Univariate analyses did not detect differences between those that developed ILD and those that did not, except again for more baseline COPD among those developing ILD (26.7% vs. 16.0%, difference of 26%, 95% CI 23-29%).

Conclusion: Although the effects of smoking and race on RA-ILD development remain unclear, incident RA patients that went on to have an ILD diagnosis had more claims for COPD at baseline. There are many potential explanations, including that COPD and ILD may be difficult to differentiate. Ongoing work will feature multivariate analyses of the effects of age, sex, race/ethnicity, smoking, and other clinical factors, on ILD onset in RA.

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Systemic Sclerosis Auto-Antibody Profiles Predict Interstitial Lung Disease Onset but Not Progression

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Objectives: Interstitial lung disease (ILD) is a leading cause of mortality in systemic sclerosis (SSc) where it is associated with the presence of anti-topoisomerase I autoantibody (aAb) (ATA) while anti-centromere aAb (ACA) may be protective. The association with other aAbs is unclear and it is unknown whether aAb profiles can predict the rate of ILD progression. Our goal was to examine the incidence of SSc-ILD and its subsequent progression between different aAb profiles.

Methods: SSc subjects without pre-existing ILD in a multi-center cohort from 2004-2018 were included. ILD was defined by high-resolution computed tomography findings, or if not was available, either a chest x-ray showed fibrosis, and/or "velcro like crackles" was present on exam. Clinically meaningful ILD progression was defined as a decline of: FVC ≥ 10%, or FVC ≥ 5% and DLCO ≥ 15%. Subjects were grouped based on single specificity aAbs: ATA, ACA, anti-RNA polymerase III (ARA), anti-PM/Scl, anti-Ku, anti-Th/To (hPOP1), anti-fibrillarin (AFA) or no detectable aAbs. The time to ILD onset and the time to meaningful progression and mortality after incident ILD were compared between groups using Kaplan Meier and multivariate Cox analyses adjusted for age, gender, diffuse disease, physician global assessment of severity, immunosuppression exposure at baseline and anti-Ro52/TRIM21 aAb positivity. ATA served as the reference for all comparisons.

Results: Of 931 patients, 190 (20%) developed ILD: 60/429 (14%) ACA, 31/94 (33%) ATA, 32/114 (28%) ARA, 6/24 (25%) anti-PM/Scl, 0/2 anti-Ku, 2/5 (40%) anti-Th/To, 4/5 (80%) AFA, and 55/258 (21%) negative aAb. Subjects with ATA developed ILD at shorter disease durations than ACA, anti-PM/Scl, and negative aAb groups (log rank p < 0.01, p = 0.02, p < 0.01 respectively). The AFA group had even earlier onset (p < 0.01). In multivariate analyses, ACA and negative aAb groups were less likely (HR (95% CI) 0.36 (0.22, 0.57) and 0.53 (0.34, 0.84) respectively), whereas AFA was more likely (HR (95% CI) 4.12 (1.22, 13.86)) to develop ILD compared to ATA. Despite this, there were no differences in the time to clinically meaningful ILD progression or survival in patients with incident ILD.

Conclusion: Although we had few AFA patients, this aAb conferred a higher risk of developing ILD compared to patients with ATA. ACA, anti-PM/Scl, and the absence of SSc specific aAbs were associated with a lower risk. Nevertheless, ILD developed in all aAb sub-groups and, once present, the aAb profile was not associated with ILD progression or subsequent mortality.

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The Impact of Psychiatric Comorbidity on Health Care Utilization and Preventative Health Care in Rheumatoid Arthritis: A Population-Based Study

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Objectives: Psychiatric comorbidity is prevalent in rheumatoid arthritis (RA). This may complicate medical care thereby increasing the risk of adverse health outcomes and health care utilization (HCU). We examined the impact of psychiatric comorbidity in RA on HCU (ambulatory care visits, hospitalizations, number of hospital days, and prescription drugs) including recommended preventative health care (influenza vaccination, pap and mammogram tests).

Methods: We accessed provincial administrative health data (1984-2016) and used a validated algorithm to identify a cohort with diagnosed RA (n = 16975). We matched each RA case on age and sex, with up to 5 controls (CNT) with no RA diagnosis (n = 84756). Psychiatric morbidities defined as depression, anxiety and bipolar disorder (PsyMb) were identified in RA cases and CNT. Annual rates of ambulatory care visits [mean visits (SD)/person], hospitalization (%), days of hospitalization [(mean days (SD)/hospitalization], prescribed drugs (mean (SD)/person), influenza vaccination (%), pap tests (%), and mammograms (%), were age and sex-standardized to the 2010 Canadian population. Ambulatory

care visits were categorized by provider (family physician [FP], rheumatologist, mental health specialist, other specialist). We compared rates of HCU and preventative care amongst four groups (CNT, CNT+PsyMb, RA, RA+PsyMb) using generalized linear models adjusted for age, sex, rural vs urban residence, income quintile, total comorbidities (using Johns Hopkins Aggregated Diagnostic Groups), disease-modifying antirheumatic drug prescription, and RA-specific procedures (e.g. arthroplasty). We reported rates and percentages with 95% confidence intervals (CI). We tested whether PsyMb and RA had additive or synergistic effects on HCU or preventative care.

Results: Most RA patients were female (72%) and urban residents (59%). Mean age at diagnosis was 54(SD:16) years. Mean follow-up duration was 13(SD:9) years. After adjustment, compared to RA without PsyMb, RA with PsyMb had an additional 3.7 (95%CI: 3.5-3.9, p=0.0001) ambulatory visits/year, 2.3 (95%CI:1.8-2.8) increased hospitalization, 0.7 (95%CI: 0.5-0.95) more hospital days/admission, and were prescribed 2.3 (95%CI 2.2-2.5) more drugs. RA+PsyMb had increased ambulatory care visits for all providers particularly FPs [additional 2.9 FP visits/year (2.8-3.0); interaction between RA, PsyMb and provider p = 0.0001]. Overall rates of preventative care in RA were 34% for influenza vaccination, 38.3% for mammograms and 43.3% for pap tests when indicated. Compared to RA, RA+PsyMb had increased influenza vaccinations (5.5%; 4.8-6.2%) and screening mammograms (4.7%; 3.7-5.7%) but not pap tests (0.2%; -1-0.06%).

Conclusion: Psychiatric comorbidity increased health care utilization in RA. Increased contact with care providers may contribute to higher rates of some preventative care but overall preventative care rates remained suboptimal.

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Taste Receptor T2R38 Polymorphisms and the Oral Microbiome in Rheumatoid Arthritis

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Objectives: Periodontal disease is a risk factor for rheumatoid arthritis (RA). The molecular links between rheumatoid arthritis (RA) and oral health remain unclear but likely involve oral microbial dysbiosis and altered host mucosal immunity. We explored a novel oral mucosal innate immune pathway involving the bitter taste receptor T2R38, with potential relevance to oral health. We aimed to evaluate whether TAS2R38 (the T2R38 gene) haplotypes associated with RA (PAV/PAV) influence the oral microbial composition of RA patients.

Methods: People with RA (n = 35) and non-RA controls (CNT, n = 64) reported oral health habits and symptoms. Genomic DNA isolated from buccal swabs was sequenced for the predominant TAS2R38 gene variants (PAV/PAV; PAV/AVI; AVI/AVI). The oral microbiome was assessed by 16SrRNA gene sequencing (V4 region) using known primers. Bacterial taxa were assigned using the eHOMD database. Microbiome alpha diversity (within samples) was calculated using Pielou`s evenness index. Beta diversity (between samples) was evaluated using weighted and unweighted UniFrac distances. The significance of diversity in oral bacterial species by RA status or by TAS2R38 haplotypes was determined using permutational analysis of variance. Linear discriminant analysis effect size (LEfSe) identified the taxa that discriminated between groups. (RA versus non-RA; TAS2R38 haplotype)

Results: RA and CNT had similar general health, smoking history and oral health symptoms and habits. ACPA positivity was associated with the functional PAV/PAV haplotype (PAV/PAV 45% ACPA +ve vs PAV/AVI or AVI/AVI 22% ACPA +ve; Chi-square = 5.2, p < 0.03). Oral microbial evenness was higher in RA compared to CNT (p = 0.03) but within RA was similar across T2R38 haplotype (p = 0.8). Beta diversity differed between RA and CNT (p < 0.01) but not across T2R38 haplotypes (p > 0.05). The most abundant bacterial genera (RA and CNT) were Veillonella, Prevotella and

Streptococcus. On LEfSE, the relative abundance of Treponema socranskii, Scardovia wiggsiae, some Prevotella species and other oral pathogens was higher in RA than CNTS. Other bacterial species including Prevotella melaninogenica and Porphyromonas sp were most abundant in controls. Taxa associated with RA based on LEfSE analysis were more similar to each other than to the taxa associated with CNTs. In RA, Prevotella and Porphyromonas sp were most abundant in AVI/AVI whereas Fusobacteria were most abundant in PAV/PAV.

Conclusion: The RA oral microbiome composition differs from controls and by TAS2R38 haplotype. These findings support a role for oral dysbiosis and mucosal innate immunity involving T2R38 in RA. Future studies of the subgingival microbiome will assess TAS2R38 genotype associations with periodontal disease in RA.

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When Will I Get Past This Exhaustion? Patterns and Risk Factors for Improved Fatigue in the First Year of RA

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Objectives: Although overwhelming fatigue is common at the onset of RA, it persists in some patients greatly affecting mood, work and home life, participation, and QoL. Among people with high fatigue at diagnosis, we identified predictors associated with improved fatigue in the first year of RA.

Methods: Data were from early RA patients (symptoms <1 year) enrolled in the Canadian Early Arthritis Cohort (CATCH) from 01-2007 to 03-2017. All met ACR1987 or 2010 ACR/EULAR criteria, had active disease, were on DMARDS, and had fatigue (0-10 NRS) data over ≥ 12 months. Patients were classified at baseline with low (< 4) or high (≥ 4) fatigue, and at 12 months as improved (↓≥ 2) or with persistently high fatigue (↓ < 2). Multivariable logistic regression was used to identify baseline predictors of improved fatigue at 12 months.

Results: Participants (N = 1002) were mostly white (81%) and female (71%) with a mean (SD) age of 54 (15); 32% were obese. At diagnosis, 70% reported high fatigue; as compared to those with low fatigue, patients reporting high fatigue were more likely to have high disease activity, OA/back pain, and obesity, and report greater pain, disability, sleep disturbance, depression, and major stressors (p < 0.05); there was a trend for patients with high fatigue to be female and seropositive. At 12 months, 70% with high fatigue reported significant improvement. Patients with improved fatigue were less likely to be obese or have fibromyalgia, had fewer comorbidities, shorter symptom duration, and lower initial fatigue. In adjusted models, predictors of improved fatigue at 1 year were MTX ≥ 20 mg (± csDMARDS; OR 1.7; 95% CI 1.0, 2.7), BMI < 30 (OR 0.6; 95% CI 0.4, 0.9), and higher baseline pain (OR 1.1; 95% CI 1.0, 1.2) after controlling for age, sex, education, and initial fatigue.

Conclusion: Debilitating fatigue is common at RA diagnosis and associated with more active disease, worse pain and disability, OA/back pain, obesity, depression, poor sleep, and major stressors. Among patients presenting with high fatigue, 70% improved by 12 months. Use of MTX ≥ 20 mg improved the odds of reduced fatigue by 70%, while obesity decreased it 40%; high initial pain may also be a marker for improved fatigue. Early MTX use and optimizing weight, sleep, and mood may attenuate persistent fatigue when RA inflammation is well controlled. These results underscore the benefits of multidisciplinary interventions in ERA.

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Predictors of Persistent Fatigue Differ in Men and Women with Early Rheumatoid Arthritis in the First Year

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Objectives: While treat-to-target strategies can dramatically reduce inflammation in RA, persistently high levels of fatigue are present in many patients. Proposed underlying causes include RA disease activity, cognitive/emotional/behavioral factors, and personal (health) factors that often differ by sex. We compared risk factors for persistent high fatigue at 12 months in women and men with early RA who were receiving guideline-based treatment.

Methods: Data were from patients enrolled in the Canadian Early Arthritis Cohort (CATCH) between 01-2007 and 03-2017 who met 1987 or 2010 ACR/EULAR RA criteria, had active disease treated with DMARDS, and had complete data on DAS28, BMI, and fatigue severity (0-10) over 12-months. Persistent high fatigue was defined as fatigue ≥ 4 at baseline with < 20% improvement by 12 months. Multivariable logistic regression was used to identify RA disease, CEB, and personal / health factors associated with persistent high fatigue in women and men.

Results: Patients (N = 1002) were mostly white (81%), female (71%), with a mean (SD) age of 54 (15), symptom duration of 6 (3) months, and BMI of 28.0 (6.1); 32% were obese (BMI ≥ 30). Women were generally younger, better educated, seropositive, and had greater disability, fatigue, depressive symptoms, and major stress in the year prior to diagnosis (p < 0.05). 21% of women and 19% of men reported persistent high fatigue throughout the first year (p = 0.13). Mean fatigue was significantly higher (p < 0.005) in women at all time points.   In multivariable regression that included all variables, predictors of persistent high fatigue in women were obesity (OR 1.7; 95% CI 1.1, 2.6), initial steroid use (OR 1.7; 95% CI 1.1, 2.7), sero-negativity (OR 0.6; 95% CI 0.4, 1.0) and poor sleep (OR 1.1; 95% CI 1.0, 1.2). In men, obesity was the only significant predictor and was associated with a 2.4 times greater odds (95% CI 1.1, 5.1) of persistent fatigue at 1 yr. Other sociodemographic and health characteristics were not associated with persistent high fatigue in men or women in multivariable models.

Conclusion: Obesity is common in ERA and is an important contributor to persistent high fatigue in both women and men; in women only, initial steroid use, seronegativity and poor sleep at baseline also predicted persistent fatigue. In obese RA patients on guideline-based treatment, life-style interventions targeting weight loss may play an important role and strategies to improve mood and manage stress may help attenuate high levels of fatigue that do not improve as RA inflammation is controlled.

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Estimating "Real-World" Unmet Needs for Achieving Remission in the First Year Following RA Diagnosis: Results from the Canadian Early Arthritis Cohort (CATCH)

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Objectives: Multiple different RA disease activity indices are commonly used in clinical practice and research. Different indices however can be inconsistent in classifying remission. Study objectives were to: 1) Compare remission prevalence across 4 common RA indices in "real-world" early RA patients; 2) compare changes in remission across indices; and, 3) Identify predictors of persistent active disease across all indices, over 1 year follow up.

Methods: Data were from patients with early RA (symptoms < 1 year) enrolled in the Canadian Early Arthritis Cohort (CATCH) between 2007 and 2018. Participants had active disease at enrollment, were treated with DMARDs and completed standardized clinical assessments every 3-months. Remission status was assessed using 4 indices: 1) DAS28 < 2.6 OR DAS28CRP < 2.5, 2) CDAI ≤ 2.8, 3) SDAI ≤ 3.3, and 4) ACR/EULAR Boolean remission – SJC28, TJC28, CRP, PGA all ≤ 1. T-tests/ chi-squared tests were used to compare differences in remission prevalence by 1 year, and changes in remission before and after release of Canadian RA guidelines (QI program). Logistic regression was used to identify predictors of persistent active disease on all 4 indices.

Results: 1202 adults were eligible for this analysis. At enrolment, 877 (73%) were women, mean (sd) age was 55 (14), average disease activity was high (DAS28 5.1 (1.4); CDAI 27 (14); SDAI 29 (15)). Prevalence of remission by 12-months follow up was 14-21% higher when estimated with the DAS28 compared with CDAI, SDAI and Boolean criteria, and 378 (31%) did not achieve remission according to any of the 4 indices. Improvement in remission after release of Canadian RA guidelines (QI program) however was similar across all 4 indices(~ +15-17%). In adjusted logistic regression, persistent active disease by 1 year follow up across all 4 indices varied by sex and was most strongly associated with positive serostatus and smoking in men, and with obesity and more tender joints in women. Pain and lower education were predictors in both men and women.

Conclusion: The choice of index had a sizable impact on estimating real-world prevalence of remission but had little to no impact on evaluating changes after a QI program. In the interim, in the absence of a single "best measure" that also takes in to account the patient's perspective, we estimate unmet needs for achieving remission in the first year of FU in 1 in 3 ERA patients who did not achieve remission by ANY of the 4 indices.

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Does Concomitant Use of Multiple Steroid Routes in Early RA Facilitate Oral Steroid Discontinuation? Results from a Real-World Canadian Cohort

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Objectives: Synthetic glucocorticoids (steroids) are recommended as "bridge therapy" to rapidly reduce inflammatory response & associated symptoms. Current treatment guidelines in Canada recommend short-term use at a low dose, tapered quickly due to side effects. Steroids exist in oral & parenteral (intramuscular or intraarticular) formulations, and can be given in combination, perhaps with the intent to shorten overall duration of steroid exposure. The objective of this study was to compare changes in disease activity and duration of oral steroid exposure among those who received oral monotherapy to those who received both oral and parenteral formulations.

Methods: Data from patients enrolled in CATCH, a nationwide real-world early RA cohort, with ≥ 24 months of follow-up. Patients were stratified based on steroid initiation (oral only vs combination parenteral and oral) within first 3 months of study entry, to account for potential lag time for treating rheumatologist to assess needs. Persons who received steroids before cohort entry were excluded, to avoid prevalent user bias. The median duration of oral steroid exposure was assessed and compared between groups using the Mann-Whitney U test. Kaplan-Meier survival curves were used to compare steroid persistence time between oral and combination groups, and differences between curves were tested using the log-rank test.

Results: After excluding 199 persons who were on steroids at baseline and 77 who were on biologics by month 3, a total of 1,217 participants in CATCH from 2007-2017 with at least 24 months of follow-up were identified. This analysis focused only on those 315 who receive an oral steroid (218 oral only, 97 combination), and excluded parenteral only or steroid unexposed persons. DAS28 scores indicating moderate or high disease activity were similar over time among steroid groups. The median duration of oral steroid use was not statistically different for combination or oral only (7.6 versus 4.8 months, p-value = 0.29). Throughout follow-up, steroid discontinuation patterns were similar (p = 0.27). Among those participants persistent with oral steroids at 9 months follow-up, the majority remained on steroids through 24 months.

Conclusion: Combining oral and parenteral steroids did not reduce disease activity more so than oral steroids, nor did the combination reduce overall duration of oral steroid treatment in this prospective observational cohort. The lack of differences may reflect treat-to-target paradigms implemented in Canadian rheumatology care.

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Associations Among Fatigue, Vitality, Sleep, and HRQL in Patients with Rheumatoid Arthritis: Data from Phase 3 Trials of Tofacitinib

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Objectives: Fatigue is a common and debilitating rheumatoid arthritis (RA) symptom that greatly impacts health-related quality of life (HRQL). Tofacitinib is an oral Janus kinase inhibitor for the treatment of RA. We evaluated the impact of tofacitinib on fatigue, vitality, sleep, and HRQL; and explored associations between fatigue and other PROs.

Methods: This post-hoc analysis pooled data from three Phase 3 trials (NCT00847613; NCT00853385; NCT00856544) of tofacitinib + csDMARDs in DMARD inadequate responder patients with RA. Patients received tofacitinib 5 or 10 mg BID, placebo (PBO); or adalimumab (ADA; 40 mg Q2W) as active control (one study). Outcomes assessed at Month (M)1, 3 (last PBO-controlled timepoint), 6, and 12 included: least squares mean changes from baseline (ΔBL) in FACIT-Fatigue, MOS-Sleep Scale (MOS-SS), SF-36 domains, CDAI, and EQ-5D; and % patients reporting outcomes ≥ normative values. We used mixed-effect linear modeling to compare tofacitinib/ADA vs PBO (to M3) and tofacitinib vs ADA (to M12); and examined associations among PROs at M6 using Pearson correlations. P values are used as a summary measure and are exploratory (ie, comparisons were post-hoc and not powered for non-inferiority/superiority e.g., tofacitinib vs ADA), with < 0.05 considered as significant.

Results: 2,265 patients were included (tofacitinib 5 mg BID, n = 826; tofacitinib 10 mg BID, n = 821; ADA, n = 199; PBO, n = 419). Baseline characteristics were similar across groups. In general, ΔBL in PROs were significantly greater with tofacitinib and ADA vs PBO through M6. At M1, ΔBL in MOS-SS Sleep Problems Index I and II, MOS-SS Sleep Adequacy, MOS-SS Somnolence; and SF-36 social functioning at M3, were significantly greater with both tofacitinib doses vs ADA, with some maintaining significance to M3 and/or M6 (all p < 0.05). To M12, ΔBL in CDAI was similar for tofacitinib 5mg BID vs ADA, and significantly

greater with tofacitinib 10 mg BID vs both at most timepoints. The % patients treated with either tofacitinib dose reporting FACIT-Fatigue and SF-36 vitality scores ≥normative values were significantly greater vs PBO at M1 and M3 (all p < 0.05), and vs ADA at M12 (SF-36 vitality only; both p < 0.05). Across groups to M6, SF-36 components/domains (particularly vitality) and EQ-5D utility score, were moderately (0.50–0.70) to highly (0.70–0.90) correlated with FACIT-Fatigue.

Conclusion: Tofacitinib or ADA generally conferred significantly greater improvements in sleep, fatigue, and HRQL (including vitality) vs PBO; with some significantly greater for tofacitinib vs ADA. FACIT-Fatigue was moderately to highly correlated with other PROs, suggesting that fatigue may be an indicator of functional disability in RA.

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Perspectives on the Implementation of a Multidisciplinary Conference Fee Code for Community-based Patients With Rheumatic Disease in BC (RHEUM-NURSE)

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Objectives: In British Columbia, rheumatologists can bill for multidisciplinary consultations for people with complex rheumatic diseases, where a patient is seen by both a rheumatologist and a nurse. It is not yet known how these consultations are being delivered across BC, and how multidisciplinary care might be affecting access to care, quality of care and patient outcomes. This project seeks to provide an in-depth understanding of the models of care adopted in BC after the implementation of the billing code (G31060) from the perspective of rheumatologists, rheumatology nurses and patients. The study is nested within a mixed-methods evaluation that aims to examine how the multidisciplinary billing code worked in BC, its intended and unintended process outcomes, what features work, and what other factors may influence outcomes.

Methods: We conducted semi-structured interviews with key stakeholders from within rheumatology practices across BC. Guided by evaluation principles and the Theoretical Domains Framework (TDF), we collected data from rheumatologists, rheumatology nurses and patients from September 2019 onward. Rheumatology practices that employ a nurse under the multidisciplinary billing code are eligible to be included in this study. We purposefully sampled practices for maximum variation in practice characteristics such as geographical location (rural vs. urban), size of practice (i.e. patient caseload), number of nurses employed, and length of time nurses have been employed.

Results: Data collection is underway and we have so far interviewed participants on Vancouver Island, in metro Vancouver and the Okanagan regions. Emerging themes from the first set of interviews relate to training needs, complementary care, patient education, quality of care and patient flow. This study will provides contextual information relating to 1) the situational context on a practice by practice level, 2) behavioural nuances that affect the implementation of the code, 3) stakeholders' individual experiences and beliefs associated with the implementation and use of the multidisciplinary care billing code, 4) patient perspectives on the shift in model of care and the impacts on patient experience and outcomes.

Conclusion: This qualitative project will offer insights into how this policy has impacted the care and outcomes of patients with complex rheumatic diseases in BC that would not be identifiable in our ongoing quantitative analysis. Our results will inform the future direction of multidisciplinary models of care in BC and provide detailed evidence on the outcomes of a policy change for people with various types of arthritis and other chronic diseases, across Canada and internationally. Supported by a CIORA Grant.

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Understanding the Preferences of People With Scleroderma Regarding Stem Cell Transplant: A Patient-oriented Approach to Inform Design of Early Phase Clinical Studies

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Objectives: Stem cell transplant (SCT) is a new treatment for systemic scleroderma offering potential life extension and alleviation of symptoms. For patients, the decisions to undergo SCT is complex. The procedure carries risks of mortality and toxicity, and inconveniences such as long-distance travel to a hospital offering the treatment. We are using a patient-oriented approach, with patients and clinicians as research partners, to optimize the design of future scleroderma clinical studies by incorporating patient priorities.

Methods: A discrete-choice experiment (DCE) survey was designed, informed by a focus group with people with scleroderma of any stage, living anywhere within British Columbia. To accommodate geographic constraints, the focus group counted with in-person and remote participation via a web dial-in. Focus group transcripts were analyzed by two independent researchers and discussed with our patient partners to guarantee fair interpretation and adequate selection of relevant attributes. DCEs are a type of survey that presents respondents with pairwise choices and asks them to choose the preferred option. Here, the options were stem cell transplant A and B, and the additional option of 'no stem cell transplant'. Each option was described by a number of attributes, identified in the focus group. Respondents were recruited through the Scleroderma Association of BC and SPIN cohort. Data collection is underway. The results will enable the estimation of preferences as well as uptake of treatments.

Results: The final list of attributes developed from focus groups (8 participants; 5 remote) were: years after treatment without further scleroderma organ damage; immune suppression treatment and risk of immediate complications; late complications (i.e. cancer); additional members to your care (in addition to your rheumatologist); number of people with scleroderma the hematologist has treated using stem cell transplant; additional cost to you (expenses not covered by the provincial health plan, nor your health insurance); distance of treatment center to your home. Patients reported that multidisciplinary care and the logistics of treatment were more influential in the decision to take treatment than the magnitude of benefits.

Conclusion: Patients' preferences and care vary according to where people live. The concerns of people with scleroderma regarding their treatment go beyond clinical effectiveness. Our patient partners were key elements of the research team and supported planning, recruitment, conceptualization of ideas and data interpretation. Knowledge regarding such concerns and the trade-offs patients are willing to make will support better clinical study designs and potentially improve the uptake for novel treatments. Top 10 Poster

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Acceptability of Care in Rheumatology Outpatient Clinics in the Context of a Nursing Model of Care

James Connell (Vancouver); Jason Kur (University of British Columbia, Vancouver); John Gurmin (Vancouver)

Objectives: Patient experience is an important indicator of quality of care. In 2010, rheumatologists in the Province of British Columbia proposed a new set of patient care approaches. These approaches focused on improving quality of care and increasing access for patients with inflammatory diseases as a response to a province-wide shortage of rheumatologists. One of the approaches witnessed was the introduction of a rheumatology nursing billing code. This code has allowed rheumatologists to work in multidisciplinary healthcare teams permitting the integration of nursing care in the management of patients with inflammatory diseases. Here we explore the acceptability of this new model of care from the patient perspective.

Methods: In 2018, patient satisfaction scores were obtained from a sample of patients with inflammatory disease from three urban rheumatology outpatient clinics in Vancouver, Canada (n = 132). The patients were given the Leeds Satisfaction Questionnaire, a standardized, validated, and reliable assessment of patient satisfaction in rheumatology outpatient clinics. Scores in six domains were measured and pooled across the three clinics and were compared to values in the literature for similar populations. The study was done as part of an evaluation of Labour Market Adjustments conducted by the BC Society of Rheumatologists.

Results: Scores were out of a possible five and are reported with 95% confidence intervals. The sampled patients reported high acceptability in all six domains: general satisfaction (4.21 [4.09, 4.34]), giving of information (4.29 [4.19, 4.38]), empathy with the patient 4.23 [4.14, 4.33]), technical quality and competence (4.55 [4.47, 4.63]), attitude towards the patient (4.36 [4.27, 4.44]), and access and continuity (4.16 [4.06, 4.26]). Overall satisfaction (4.30 [4.22, 4.38]), an average of the scores from the six domains, was equal to or higher than the compared values published in the literature.

Conclusion: Examining the Vancouver results independently we see all categories scoring over 4/5, suggesting high acceptability. The results show equal or significantly higher acceptability scores in the Vancouver population receiving multidisciplinary care, suggesting that the nursing model of care is equally or more acceptable compared to the reference populations from Edmonton and Norway. The evaluators conclude that any effect on the acceptability of care for BC residence caused by the introduction of the labour market adjustments has not made care less acceptable than that of comparable populations.

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Patient Safety and the Implementation of a Standardised Immuno-suppressant Risk Review in Outpatient Rheumatology Care

James Connell (Vancouver); Jason Kur (University of British Columbia, Vancouver); John Gurmin (Vancouver)

Objectives: The complexity of patients seen by rheumatologists has escalated over recent decades. New immunosuppressant and chemotherapy medicines used to treat rheumatic diseases carry significant risk for the patients and cost to the health care system. Pharmacare data has shown that there has been a continued rise in use of new biologic medications. Many of the biologic medicines used to treat rheumatoid arthritis raise concerns such as reactivation of tuberculosis and infection risk. Rheumatologists in BC funded the implementation of an immunosuppressant case review tool. This checklist tool explores patient risk factors and potential complications that are encountered when placing patients on strong immunosuppressant medications. It helps to reduce unwanted exposure to risk and improve health promotion through activities such as vaccinations that are key modes of intervention in these patients. As part of an evaluation of labour market adjustments in BC rheumatology, the evaluators measured the uptake of the immunosuppressant review tool.

Methods: Medical Service Plan data was provided by Doctors of BC in order to measure the number of times the immunosuppressant-associated fee code was billed since its implementation. The total number of billings per year was divided by the number of practicing rheumatologists in the respective year to obtain a measurement of the average number of times the code was used per rheumatologist in the province of BC.

Results: In the 2011/12 fiscal year the code was billed 3418 times, whereas in 2017/18 the code was billed 12686 times, an increase of 271% over the six-year period. Billing data show that since the implementation of the code in 2011 there was a 151% increase in the number of times it was billed per rheumatologists (2011/12-2017/18), with an average increase of 17% per year. In the same time period, the amount of total payments increased from $136 720 in 2011/12, to $519 999 in 2017/18, an average increase of 25% per year.

Conclusion: The immunosuppressant tool has been successfully implemented in rheumatology clinics throughout the province and uptake has been substantial. The tool has the potential to increase vaccination rates and encourage discussions of vaccines among patients with autoimmune diseases. It also has the potential to mitigate TB and infection risk in this patient population. The implementation of the tool has the potential to

increase patient safety, reduce hospitalisations, and help reduce reliance on other health care resources.

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Immune Checkpoint Inhibitors and Sicca/Sjogren's Syndrome: A Case Series and Review of Literature

Kevin Lee (University of Alberta, Edmonton); Ambika Gupta (University of Alberta, Edmonton); Carrie Ye (University of Alberta, Edmonton)

Objective: Immune checkpoints allow immunologic self-tolerance. However, cancer cells may enhance this to avoid death; immune checkpoint inhibitors (ICI) are antibodies that block this, resulting in increased T-cell activation, immune response, and even immune-related adverse events including sicca/Sjogren's syndromes. Although the syndromes were recently reported to have partial improvement with corticosteroids and ICI discontinuation, occurrence with atezolizumab, near-complete symptom resolution without corticosteroids, and response to hydroxychloroquine have not yet been reported.

Case Presentation: We report two cases where atezolizumab-associated sicca responded well to pilocarpine and ICI discontinuation and pembrolizumab-associated sicca responded to pilocarpine and hydroxychloroquine despite continuing ICI. Case 1: A 79-year-old man with metastatic urothelial carcinoma was treated with carboplatin, gemcitabine, and atezolizumab for six cycles. He subsequently had two atezolizumab cycles before developing pneumonitis, requiring a six-week prednisone taper and ICI discontinuation. Five months later, he developed xerostomia with loss of taste and severely cracked tongue. He had no parotid or salivary gland enlargements, dry eyes, or other rheumatologic findings. Two months of conservative management with Biotene spray, mouth rinse, and gum provided only twenty minutes of relief. However, two months of pilocarpine (5mg QID) significantly improved salivation, taste, and speech; he now takes pilocarpine BID with plan to discontinue. Case 2: A 53-year-old man with Graves disease history and lung adenocarcinoma with adrenal metastasis was treated with radiation to right chest, carboplatin and pemetrexed before switching to four cycles of carboplatin and gemcitabine due to liver toxicity. Due to cancer progression, he started pembrolizumab four months later. After two months, he developed mild xerostomia refractory to conservative management. Symptoms worsened over the next seven months with oral cavity bleeding, dysphagia, reduced saliva pooling, gritty eyes, and increased lacrimation. Labial minor salivary gland lobule biopsy showed 0 to 2 foci/lobule with overall score of 1. He had no parotid or salivary gland enlargements, or other rheumatologic findings. Addition of pilocarpine (5mg QID) and eye drops minimally improved symptom. However, addition of hydroxychloroquine (400mg BID) significantly ameliorated symptoms over the ensuing 4 to 8 months to near resolution. During this time, he continued pembrolizumab for cancer management.

Conclusion: We report cases of ICI-associated sicca responding well to pilocarpine, ICI discontinuation, and hydroxychloroquine. These cases, which demonstrated symptom reversibility and response to hydroxychloroquine, may suggest differences between ICI-associated- and primary-Sjogren's. Furthermore, the second case shows a therapy regime whereby ICI discontinuation may not be needed for symptom control.

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Herpes-Zoster Immunization Practices in an Urban Rheumatology Clinic

Patricia Malinski (University of Toronto, Mississauga); Andrew Chow (Credit Valley Rheumatology, University of Toronto, Mississauga); Elaine Soucy (Credit Valley Rheumatology, University of Toronto, Mississauga)

Objectives: In November 2018, new vaccination guidelines were released for populations with immune-mediated disorders on immunosuppressive therapies. There is particular interest in appropriate shingles immunization for populations on a common disease-modifying antirheumatic drug (DMARD), Tofacitinib, which increases the risk of herpes zoster infection. However, immunization rates remain suboptimal in this at-risk group. The purpose of this project was to investigate immunization data in an urban rheumatology clinic, and to inform strategies for vaccine status improvement.

Methods: The charts of 74 active patients who were, or had previously been, on Tofacitinib were reviewed between June 24th, 2019 and August 9th, 2019. Descriptive statistics were calculated. Using this clinical data as well as anecdotal input from two rheumatologists, strategies for vaccine status improvement were identified.

Results: 78.4% (n = 58) of patients had received at least one immunization for herpes zoster. 47.8% and 75.0% of these patients were immunized with Shingrix and Zostavax prior to Tofacitinib treatment, respectively. The proportion of herpes zoster immunization has been increasing since the release of Shingrix in October 2017. 81.8% of patients who received Shingrix received both doses, and there was a lack of follow-up documentation for patients who had only received one dose. In most cases where patients were not immunized at all, there was no recorded reason for this lack of immunization (31.3%). The same proportion of patients who had not been vaccinated had discussed immunization with their rheumatologist but were not followed-up with on the matter.

Conclusion: While new guidelines now assist rheumatologists in weighing the quality of vaccine protection over disease aggravation and the risk of adverse events, downstream efforts are still required to improve herpes zoster immunization rates within this rheumatology clinic. An EMR reminder for continuing discussions about immunization and ensuring follow-up once the Shingrix series has been initiated may be helpful in improving immunization rates. Establishing a protocol for the nurse or administrative staff to call primary care providers or patients about recent vaccinations completed outside of the clinic may also be helpful. These strategies address the persistent efforts required to ensure high vaccination rates, and to ensure that the most current information is being recorded.

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Osseous Sarcoidosis

Jaclyn Shelton (University of Alberta, Edmonton); Robert Lambert (University of Alberta, Edmonton); Elaine Yacyshyn (Division of Rheumatology, University of Alberta, Edmonton)

Background: Osseous sarcoidosis stemming from diabetes.

Case Presentation: A 41-year-old male with known insulin-dependent diabetes mellitus presented with a one-year history of generalized weakness and ambulatory leg pain. He had a reduced appetite and early satiety. His symptoms progressed and he later developed daily nausea and vomiting with an unintentional weight reduction of 45 kg. He also developed drenching night sweats. He was admitted to a regional hospital for dehydration and weakness, with uneventful evaluations, and was discharged home. Due to on-going gastrointestinal symptoms, upper endoscopy with biopsy was performed and found to be unremarkable. During his hospitalizations, a chest X-ray was completed, which incidentally noted a lytic lesion of the right humerus. Further evaluations showed multiple lytic lesions concerning for malignancy. He underwent evaluations for possible malignancy, including a bone scan, skeletal survey, and a CT chest, abdomen, and pelvis. These studies showed minor left lung base atelectasis in addition to diffuse lytic lesions. He was evaluated by Hematology and at a Cancer Institution. A bone marrow biopsy was negative for malignancy, however showed granulomatosis with focal necrotizing features. Initial pathology review suggested a differential diagnosis of chronic infectious disease or sarcoidosis. There was no evidence for a plasma cell dyscrasia, and flow cytometry analysis was also unremarkable. The bone marrow biopsy was negative for Acid-Fast Bacillus (AFB); Tuberculin Skin Tests and Interferon-Gamma Release Assays (IGRA) were unremarkable. Further evaluations for malignancy were negative. He was also evaluated by Infectious Disease and had numerous studies completed, including Brucella, Coxiella, Blastomycosis and Histoplasmosis. These studies were negative. He was also HIV and Hepatitis B and C negative. An Ophthalmology evaluation was negative, and he denied a history of iritis or uveitis. A PET/CT scan showed numerous lytic lesions, however there was no significant fluorodeoxyglucose (FDG) uptake and no evidence of active

sarcoidosis of the bone lesions. There was no evidence of pulmonary or cardiac sarcoidosis. He was diagnosed with osseous sarcoidosis and was monitored without further treatment. His diabetic management was later optimized and at last evaluation was stable.

Conclusion: Sarcoidosis is a heterogeneous systemic inflammatory disease characterized by non-caseating granulomatous inflammation, often with pulmonary and cardiac manifestations. Osseous sarcoid lesions are typically found in small bones, typically the phalanges, and can present as osteosclerosis, osteolysis, cystic changes, and trabecular or honeycomb patterns on radiographic imaging. Osseous sarcoidosis is a rare condition, that requires health providers to be aware of the differential diagnosis.

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A Case of Fibroblastic Rheumatism

Julia Tan (University of British Columbia, Vancouver); Mohammad Bardi (University of British Columbia, Vancouver); Diane Lacaille (University of British Columbia (Division of Rheumatology)/ Arthritis Research Canada, Richmond)

Background: Fibroblastic rheumatism (FR) is a rare dermato-arthropathy with only around 30 cases reported in the literature. We present a patient with biopsy-proven FR and several unique features.

Case description: A 37-year-old female, previously healthy, referred with a 9-year history of symmetrical polyarthritis and cutaneous nodules. She also endorsed joint stiffness, thickening of the skin over her fingers, Raynaud's phenomenon (RP), and pleuritic chest pain. She had an elevated CRP, positive ANA, and radiographic DIP erosions and ankylosis. FR was diagnosed on biopsy 3 years after her initial presentation. She was trialed on hydroxychloroquine, prednisone, methotrexate, and adalimumab, with little improvement. Her symptoms did not respond until she was tried on a 2.5-year course of rotating amoxicillin and ciprofloxacin for possible Lyme's disease. These antibiotics were discontinued due to hospitalization for a multi-drug-resistant pneumonia. 20 years after her initial presentation, despite cessation of all therapy, the patient reported stabilization of her symptoms. In 2019, the patient was reviewed for further management. She did not have any active synovitis and her nodules had regressed. She still had mild pleuritic chest pain 1-2 times a month, migratory arthralgias, RP, and developed finger flexion contractures.

Discussion: Clinically, FR is characterized by a sudden onset of symmetrical, progressive, erosive polyarthritis and cutaneous nodules. The hands and feet are the main sites of involvement. Cutaneous manifestations may proceed or follow joint involvement by several months. Additional clinical features that are commonly reported include erythematous papules or plaques, RP, and progressive skin tightening resulting in flexion contractures. Patients typically have negative serological markers including anti-cyclic citrullinated peptide, rheumatoid factor, and CRP. A positive ANA, which was also noted in our case, has been reported twice. Ultimately, biopsy is required to confirm the diagnosis of FR. There is no standardized treatment for FR. Several medications including methotrexate, prednisone, infliximab, hydroxychloroquine, nonsteroidal anti-inflammatories, penicillamine, acetylsalicylate, interferon-alpha, and colchicine have been tried, but no one drug seems to consistently treat all cases. Furthermore, symptoms tend to self-remit in 6 months to a few years leading to the possibility that no treatments have truly made a difference.

Conclusion: We describe a case of biopsy-proven FR with several unique features including the first report with symptoms suggestive of internal organ involvement, as demonstrated by our patient's persistent pleuritic chest pain. Other atypical features include an elevated ANA and continuous presence of cutaneous nodules more than 9 years from onset of disease. Top 10 Poster

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IgG4-related Disease as a Mimicker of Malignancy

WanLi Zhou (University of British Columbia, Vancouver); Timothy Murray (University of British Columbia, Vancouver); Liliana Cartagena (Arthritis Research Canada, Vancouver); Howard Lim (Medical Oncology, University of British Columbia, Vancouver); David Schaeffer (Pathology, University of British Columbia, Vancouver); Graham Slack (University of British Columbia, Vancouver); Brian Skinnider (University of British Columbia, Vancouver); Robert Irvine (University of British Columbia, Vancouver); Silvia Chang (University of British Columbia, Vancouver); Mollie Carruthers (University of British Columbia, Vancouver); Luke Chen (University of British Columbia, Vancouver)

Objectives: IgG4-related disease is an immune-mediated inflammatory disease that may present as a tumefactive lesion in nearly any organ. These mass lesions often resemble malignancy both clinically and radiologically, and in some cases, patients may undergo unnecessary surgical resection for a disease that is generally responsive to medical management. We performed a retrospective study of patients in Vancouver with IgG4-RD with a focus on those who were thought to have a malignancy and in particular those who underwent unnecessary surgical procedures.

Methods: We performed a retrospective chart review of patients with IgG4-RD at Vancouver General Hospital. We recorded whether they were initially believed to have a malignant diagnosis, if they underwent a surgical procedure as a result of the diagnostic ambiguity.

Results: Of 64 patients diagnosed with IgG4-RD, 38 were initially thought to have a malignancy. Fifteen of these 38 patients underwent a surgical intervention either to alleviate the severity of their symptoms or as treatment for their malignancy. The most common misdiagnosed malignancy was lymphoma, followed by pancreatic cancer. Common features that tend to predispose a malignancy misdiagnosis include patient age outside of the 5th/6th decade, female gender, normal serum IgG4 levels, discrete mass lesions on imaging, and severe initial presenting symptoms.

Conclusion: IgG4-RD may present as a mass lesion in nearly any organ and should be on the differential diagnosis of patients suspected to have cancer. Biopsy where possible is important both to confirm the diagnosis of IgG4-RD and to exclude neoplastic mimickers.

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A Rare Case of Hydroxychloroquine-induced Myopathy in an Elderly Female With Rheumatoid Arthritis: When It's More Than the Steroids to Blame for Weakness

Stewart Spence (The Ottawa Hospital, Ottawa); Marissa Keenan (Ottawa University, Ottawa); Christopher Mansour (The Ottawa Hospital, Ottawa); Dominique Yelle (The Ottawa Hospital, Ottawa)

Background: Hydroxychloroquine is commonly used in the treatment of connective tissue diseases, including rheumatoid arthritis (RA), and has a favourable side effect profile. Hydroxychloroquine-related myotoxicity is rare and may easily go unrecognized in patients with multiple comorbidities, particularly those on chronic steroids. We report the unique case of an 86-year old female with RA who developed hydroxychloroquine-induced myotoxicity superimposed on a background of steroid myopathy, and draw attention to the importance of recognizing it as a distinct entity due to its reversible nature.

Case Presentation: Our patient is an 86-year old female with seronegative RA on longstanding prednisone 10mg daily and hydroxychloroquine 200mg twice daily, who presented with a two-month history of progressive bilateral proximal leg weakness, numbness in her hands and feet, and an inability to ambulate. Co-morbidities included coronary artery disease, dyslipidemia, and stage IV chronic kidney disease. Upon initial assessment, the patient appeared cushingoid with hyperpigmented and extensively bruised skin. Neurological assessment demonstrated reduced proximal muscle power in the lower extremities (2/5 in hip flexion and knee extension, 3/5 in knee flexion, and 4/5 in dorsi-and plantar flexion bilaterally). Musculoskeletal examination revealed chronic RA changes. Investigations revealed elevated CK (730 u/L), however this was confounded by an elevated troponin presumed to be from underlying coronary disease-related demand ischemia. Initially, steroid myopathy was suspected. Electromyography (EMG) showed diffuse fibrillation potentials and positive sharp waves with early recruitment in the right deltoid and the left lateral femoris suggesting a possible inflammatory versus toxic myopathy. There was no EMG evidence of underlying neuropathy, mononeuritis multiplex, or demyelinating

polyradiculopathy. Serum inflammatory myositis, paraneoplastic, and anti-HMG-CoA reductase antibodies were negative. The patient was treated with increased steroids for possible inflammatory myositis while awaiting muscle biopsy, and statin was discontinued without improvement in her symptoms. Quadriceps biopsy demonstrated wide-spread intermyofibrillar vacuoles containing whorled membranous bodies and accumulation of basophilic p62-positive material, consistent with hydroxychloroquine-induced myopathy. Biopsy also showed selective atrophy of type II fibers consistent with corticosteroid myopathy. Prednisone was tapered and hydroxychloroquine was stopped. Her weakness slowly improved, in keeping with the known natural history of hydroxychloroquine-induced myopathy.

Conclusions: Our case highlights that although myotoxicity is an uncommon complication of hydroxychloroquine exposure, it should remain on the differential when faced with a patient with unexplained progressive weakness and should be considered in addition to more common causes, such as steroid-induced myopathy.

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Autoimmune Encephalitis and Related Disorders Are Not Rare in British Columbia

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Objectives: Autoimmune encephalitis (AE) is a spectrum of disease that presents in a heterogenous manner often eluding diagnosis. Autoimmune encephalitis presents with seizures, neuropsychiatric manifestations, movement disorders, transverse myelitis and limbic encephalitis, commonly leading to hospitalization. Rheumatology is frequently consulted to assess these patients for connective tissue disease and to generate specific management suggestions in disease modifying therapies, biologic agents and chemotherapy. This observational chart review of AE aims to assess the burden of autoimmune encephalitis and related disorders at a Canadian academic medical center.

Methods: All patients, with serum and/or cerebral spinal fluid autoimmune encephalitis/paraneoplastic encephalitis antibody/related disorders testing results available from the Vancouver General Hospital Laboratory from January 1st 2018 to December 31st 2018 were identified. The electronic records at Vancouver Coastal Health were used to determine basic demographics, comorbidities, clinical presentation, imaging, length of stay and treatment.

Results: There were 1266 individual tests ordered with 315 individual patients identified. Of those, there were 37 seropositive patients but 28 patients with available data. There were 14 seronegative patients identified. The autoimmune encephalitis patients included NMDA (n = 3), LG1 (n = 2), CASPR2 (n = 1) and paraneoplastic encephalitides included GAD65 (n = 2), PNMA2 (n = 5), Recoverin (n = 3) as well as at least one case of MOG, SOX1, Yo, Aquaporin 4, CV2 and Titin. In the seronegative group, there were 14 patients of which there were four autoimmune encephalitis and four seronegative NMO (neuromyelitis optica) cases. The most common presentation in all groups included seizure in 43% (18/42) of patients followed by movement disorder (n = 17), neuropsychiatric manifestations (n = 16) and a few cases of transverse myelitis, headache, autonomic dysfunction. The average length of stay was 18.5 days and there were 5 ICU (intensive care unit) admissions. The immunosuppressive agents utilized included corticosteroids, azathioprine, mycophenolate, rituximab, IVIG (intravenous immunoglobulin) and cyclophosphamide.

Conclusion: Autoimmune encephalitis is not rare in a Canadian academic medical center and should be considered in patients presenting with a wide spectrum of neurologic disease. Rheumatology can play an essential role in providing optimal management of these patients.

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Anti-kelch-like 12 and Anti-hexokinase 1 Autoantibodies in Primary Biliary Cholangitis: Analysis of Prevalence and Association With Disease Severity and Systemic Sclerosis

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Objectives: Primary biliary cholangitis (PBC) is an autoimmune liver disease with serum markers such as anti-Mit3, anti-sp100 and anti-gp210 autoantibodies (aAbs). Anti-kelch-like 12 (anti-KLHL12) and anti-hexokinase 1 (anti-HK1) were recently shown to improve sensitivity of PBC diagnosis in anti-mitochondrial aAb negative patients. For anti-KLHL12 detection, a linear peptide (KL-p) has been identified and is used. Our aim was to analyze the prevalence of these novel aAbs in PBC sera and their correlation with disease severity. Their prevalence was also determined in patients newly diagnosed with systemic sclerosis (SSc) within a previously studied PBC cohort.

Methods: 100 patients with PBC were recruited from a tertiary hepatology clinic at University of Montreal Hospital Center (J Rheumatol 2017;44:33-9). The Mayo Risk Score for PBC was used for assessing disease severity. The 2013 ACR/EULAR criteria were used for diagnosis of SSc. aAbs to Mit3, sp100, gp210, HK1 and KL-p were measured by particle-based multi-analyte technology (Inova Diagnostics, San Diego, CA) using recommended cutoffs. Statistical analysis was performed with 2-tailed Fisher's exact test to compare categorical variables and t-test or Mann Whitney U test to analyze continuous variables.

Results: 33% and 20% of patients were respectively positive for anti-HK1 and anti-KL-p, whereas 94%, 27% and 14% were positive for anti-Mit3, anti-gp210 and anti-sp100. When compared for age at diagnosis, time after diagnosis, liver function tests, serum albumin, immunoglobulins, platelet count and INR, few results were statistically significant although there was a tendency for more severe parameters in anti-HK1 and anti-KL-p positive patients. Anti-HK1 positive vs. anti-HK1 negative patients had higher serum ALT (50 vs. 39.8 IU/L, p = 0.04) and total IgG (15.3 vs. 12.2 g/L, p = 0.01). Serum albumin was significantly lower in anti-KL-p positive patients (37.4 vs. 39.7 g/L, p = 0.047). No difference in Mayo Risk Score was found between anti-HK1 groups (4.3 vs. 4.1, p = 1) and anti-KL-p groups (4.4 vs. 4.1, p = 0.6) nor between anti-HK1 and anti-KL-p positive patients (4.1 vs. 4.2, p = 0.8). Among 17 patients with SSc and PBC, none were positive for anti-KL-p compared to a 24% prevalence in patients who did not meet SSc criteria (p = 0.02). No difference in anti-HK1 positivity was found in patients with vs. without SSc (29% vs. 34%, p = 1).

Conclusion: No correlation was found between anti-HK1 and anti-KL-p and more severe PBC. However, the absence of SSc patients positive for anti-KL-p suggests that this aAb may be specific for isolated PBC.

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An Unusual Cause of Petechial Rash

Mena Bishay (Queen's University, Kingston); Tabitha Kung (Queen's University, Kingston)

Background: The various manifestations of scurvy can easily be mistaken for rheumatologic conditions.

Case Presentation: A previously healthy 33-year-old male presented with severe atraumatic right knee pain progressing to the left knee and bilateral ankles over four weeks. He also developed slight swelling starting in the right popliteal fossa which progressed to involve the entire right and left legs. A few days after the pain started, he developed a palpable purpuric rash with ecchymoses on his lower extremities bilaterally and was unable

to ambulate due to pain. On examination, he had purpura centered around his follicles on his upper legs, and ecchymoses from the knees down. There was no joint effusion, and he had pain throughout the legs, particularly in the calves and the ankles with movement. He had no other signs of vasculitis or connective tissue disease. His hemoglobin was 67, MCV 87, and he had no evidence gastrointestinal bleeding. His haptoglobin was normal and DAT was negative. The total bilirubin was elevated at 31 and conjugated bilirubin was normal. His CRP was 74 and ESR was 102. An autoimmune panel including ANA, ENA, RF, anti-CCP, anti-dsDNA and ANCA's, complements and cryoglobulins were all non-contributory. Infectious workup was negative for HIV, hepatitis B and C, Lyme disease, and parvovirus. X-rays of the knees demonstrated mild joint space narrowing. An MRI of the right knee demonstrated subcutaneous edema with a small joint effusion. A radiolabeled RBC scan revealed blood pooling within the bilateral calves and right ankle, but no active bleeding at that time. Further history revealed that he had a very vitamin poor diet. Upon testing his vitamin C level was found to be undetectable. His skin biopsy showed perivascular and perifollicular erythrocyte extravasation in the superficial dermis, as well as fragmented coiled hairs, consistent with a diagnosis of scurvy. He was treated with IV and PO vitamin C and his symptoms rapidly improved.

Conclusion: A review of the literature finds several case reports of scurvy masquerading as cutaneous vasculitis. Manifestations are numerous and may include constitutional symptoms such as fatigue, weakness, ecchymosis, petechiae, panniculitis, coiled hair, myalgias, joint effusions, osteopenia, sicca symptoms, lung nodules, and pulmonary hypertension. Gingival bleeding occurs only in those who have teeth. Ultimately, if left untreated scurvy can lead to sudden death or infections. The various manifestations of this disease can easily be mistaken as rheumatologic conditions, including vasculitis. In cases of purpuric rash as a presenting feature, scurvy should be considered as part of the differential diagnosis.

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