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Canadian Rheumatology Association Meeting Quebec City Convention Centre Quebec City, Quebec, Canada February 8–11, 2023

The 77th Annual Meeting of the Canadian Rheumatology Association was held both in person at the Quebec City Convention Centre in Quebec City, Quebec, Canada, and virtually on February 8–11, 2023. The program consisted of presentations covering original research, symposia, awards, and lectures. Highlights of the meeting include the following 2023 Award Winners: Distinguished Rheumatologist, Gilles Boire; Distinguished Investigator, Murray Baron; Distinguished Teacher-Educator, Janet Pope; Emerging Investigator, Lihi Eder; Emerging Teacher-Educator, Steven Thomson; Ian Watson Award for the Best Abstract on SLE Research by a Trainee, Laura Whittall-Garcia; Phil Rosen Award for the Best Abstract on Clinical or Epidemiology Research by a Trainee, Timothy Kwok; Best Abstract on Research by a Rheumatology Resident, Mats Junek; Best Abstract on Basic Science Research by a Trainee, Marie-Hélène Normand; Best Abstract by a Post-Graduate Research Trainee, Leah Flatman; Best Abstract on Quality Care Initiatives in Rheumatology, Amanda Steiman; Best Abstract by a Medical Student, Shakeel Subdar; Best Abstract by an Undergraduate Student, Jeremiah Tan; Best Abstract by a Rheumatology Post-Graduate Research Trainee, Nicole Andersen; Best Abstract on Research by Young Faculty, Alexandra Legge; Best Abstract on Spondyloarthritis Research, Patricia Remalante-Rayco; Practice Reflection Award, Gold, Carrie Ye and Janet Roberts; Practice Reflection Award, Silver, Lillian Lim. Lectures and other events included: Keynote Lecture by Fiona Rawle: Communicating Science to Patients: Complexities & Caveats; Keynote Address by Murray Baron, Distinguished Investigator Awardee: New Outcome Measures for Systemic Sclerosis; State of the Art Lecture by John Isaacs: Precision Medicine in RA – The Precision Gap; Dunlop-Dottridge Lecture by Rae Yeung: What's in a Name? That Which We Call JIA, By Any Other Name, Would It Still Be the Same Childhood Arthritis?; and the Great Debate: Be it Resolved that Canadians With New Inflammatory Arthritis Should Have Access to All Therapeutic Options at Disease Onset to Induce Remission. Arguing for: Cory Baillie and Anne MacLeod, and against: Michelle Batthish and Louis Bessette. 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 of Rheumatology*.

PODIUM PRESENTATIONS

POD01

Childhood-Onset Systemic Lupus Erythematosus: Long-term Outcomes in a Large Multiethnic Ontario Cohort

Ha-Seul Jeoung (University of Toronto, Toronto); Kuan Liu (University of Toronto, Toronto); Roberta Berard (Children's Hospital, LHSC, London); Wesley Fidler (St. Joseph's Care Group, Thunder Bay); Janet Pope (University of Western Ontario, London); Johannes Roth (Children's Hospital of Eastern Ontario, Ottawa); Carter Thorne (The Arthritis Program Research Group, Newmarket); Andrea Knight (The Hospital for Sick Children/ University of Toronto, Toronto); Linda Hiraki (Division of Rheumatology, The Hospital for Sick Children; Division of Genetics, SickKids Research Institute; Faculty of Medicine, University of Toronto, Toronto); Earl Silverman (Division of Rheumatology, The Hospital for Sick Children; Faculty of Medicine, University of Toronto, Toronto); Deborah Levy (Division of Rheumatology, SickKids Hospital; Faculty of Medicine, University of Toronto, Toronto)

Objectives: The long-term morbidity and mortality of childhood-onset SLE (cSLE) after transition to adult care is not well-documented. The present study aims to fill this knowledge gap by analyzing outcomes in a large province-wide cSLE cohort linked to multiple administrative healthcare databases. Our objectives were to (1) determine all-cause and cause-specific mortality rates, adverse renal event rates, cardiovascular event rates, and cancer rates in cSLE; and (2) determine baseline characteristics associated with higher rates of transition between 3 different states: event-free, adverse renal event, and death.

Methods: Clinical data were abstracted for cSLE patients diagnosed between January 1991 and March 2011 and followed for ≥ 1 year after contacting all pediatric and adult rheumatologists and nephrologists practicing in Ontario. Data and Ontario Health Insurance Plan (OHIP) numbers were securely transferred to the Institute for Clinical and Evaluative Sciences (ICES). OHIP numbers were transformed into an encrypted ICES key number used to link the cohort to multiple administrative datasets to determine the outcomes of interest. We examined descriptive summaries of major outcomes including death, adverse renal events (endstage kidney disease [ESKD] requiring chronic dialysis and renal transplant), cardiovascular events (including angina, transient ischemic attack, endocarditis, myocardial infarction, pericarditis, stroke), and cancer. We used a multistate Cox model to determine baseline characteristics associated with higher rates of transition from being event-free to experiencing an adverse renal event, from being event-free to experiencing death, and from experiencing an adverse renal event to death.

Results: There were 38 deaths in a cohort of 615 patients at a mean follow-up time of 14.4 years. The all-cause mortality rate was 3.36 per 1000 person-years. The rates for ESKD requiring chronic dialysis and renal transplant were 3.87 and 2.43 per 1000 person-years, respectively. The rates for any type of cardiovascular event and cancer were 6.49 and 3.47 per 1000 person-years, respectively. The multistate Cox model indicated that the Black ethnic group (HR 3.58; 95% CI 1.6-8.0) and the presence of renal involvement at baseline (HR 2.19; 95% CI 1.2-4.1) were significantly associated with higher rates of transition from event-free to adverse renal event. Additionally, the Black ethnic group (HR 5.45; 95% CI 1.6-18.8) was significantly associated with higher rates of transition from event-free to death.

Conclusion: In this large multiethnic cSLE cohort, ethnicity was associated with adverse outcomes including renal events and death. Further analyses will help inform risk for adverse outcomes to improve clinical care for the highest-risk patients.

POD02

Personalizing Cardiovascular Risk Prediction for SLE Patients

May Choi (University of Calgary, Calgary); Brittany Weber (Brigham and Women's Hospital, Boston); Hongshu Guan (Brigham and Women's Hospital, Boston); Kazuki Yoshida (Brigham and Women's Hospital, Boston); Daniel Li (Brigham and Women's Hospital, Boston); Jack Eldrodt (Brigham and Women's Hospital, Boston); Emma Stevens (Brigham and Women's Hospital, Boston); Austin Cai (Brigham and Women's Hospital, Boston); Brendan Everett (Brigham and Women's Hospital, Boston); Karen Costenbader (Brigham and Women's Hospital, Boston)

Objectives: The risk of cardiovascular disease (CVD), including myocardial infarction (MI) and stroke, is increased in SLE patients and is underestimated by current generic prediction algorithms including the 10-year atherosclerotic cardiovascular disease (ASCVD) risk score. The purpose of this study was to develop an SLE-specific prediction tool to provide a more accurate estimate of CVD risk by including both traditional and SLE-related CVD risk factors.

Methods: We included SLE patients enrolled in the Brigham and Women's Hospital SLE Cohort and collected one-year baseline data on traditional CVD risk factors, and demographic and SLE clinical features from the electronic medical record at cohort enrollment. A up to ten-year follow-up period for CVD events began on day +1 at end of the baseline period (index date). The primary outcome was the first major adverse cardiovascular events (MACE, composite of first myocardial infarction, stroke, or cardiac death) in the follow-up period. These were identified by ICD-9/10 codes and adjudicated by medical record review by board-certified cardiologists as either definite or probable events. The secondary outcome was boarded to include the first event of: carotid artery occlusion or stenosis, transient ischemic attack, atrial fibrillation/flutter, heart failure, peripheral vascular disease, or angina pectoris. Three Cox regression risk prediction models that categorized patients into low (< 7.5%), moderate (7.5-20%), and high (> 20%) risk over 10 years were derived: (1) primary outcome with definite/probable events, (2) combined model 1 and secondary outcomes, and (3) primary outcome with definite events only. We performed LASSO regression for variable selection and assessed model performance.

Results: We included 1243 patients; 93.0% female and mean age of 41.6 (SD 13.3) years. There were 90 definite/probable MACEs and 211 secondary events over the follow-up period. The variables selected were ASCVD risk score, disease activity, disease duration, creatinine level, presence of anti-dsDNA, anti-RNP, lupus anticoagulant, anti-Ro60/SSA, and low C4 (Table 1). Model performance improved in comparing risk predicted by ASCVD risk score alone vs ASCVD risk score combined with selected SLE variables by LASSO regression for models 1 and 2, particularly at year 1. For these models, the number of SLE patients who were classified as high risk (> 20%) more than doubled when selected SLE variables were added to the ASCVD model compared to the ASCVD model alone.

Conclusion: Our novel SLE-specific CVD risk prediction scores enhanced

Table 1. Beta Coefficients, Model Performance, and Risk Classification for Models 1, 2, and 3 using the Atherosclerotic Cardiovascular Disease (ASCVD) Score with and without SLE-Selected Variables

	MODEL 1 (Primary Outcome, Definite + Probable Events)	MODEL 2 (Combined Model 1 and Secondary Events)	MODEL 3 (Primary Outcome, Definite Events Only)
BETA COEFFICIENTS FOR MODEL WITH ASCVD RISK SCORE ONLY			
ASCVD	6.42	5.09	6.51
BETA COEFFICIENTS FOR MODEL WITH ASCVD RISK SCORE AND SLE-SELECTED VARIABLES			
ASCVD	5.44	4.58	5.40
Disease activity	0.31	0.33	0.34
Disease Duration	0.04	0.02	0.04
Creatinine Level	0.17	0.23	0.17
Anti-dsDNA Positive	0.35	0.03	0.33
Anti-RNP Positive	0.22	0.12	0.41
Lupus Anticoagulant	0.47	0.30	0.40
Anti-Ro60/SSA Positive	0.31	0.23	0.15
Low C4	0.49	0.40	0.51
ASSESSMENT OF MODEL PERFORMANCE			
Integrated Time-Dependent AUC			
ASCVD only	0.71	0.65	0.69
ASCVD and selected SLE variables	0.77	0.67	0.76
Harrell's C-statistic	0.76	0.67	0.76
Optimism-Corrected Harrel's C-statistic	0.73	0.66	0.73
Year 1 AUC			
ASCVD only	0.60	0.60	0.60
ASCVD and selected SLE variables	0.68	0.60	0.68
Year 10 AUC			
ASCVD only	0.65	0.64	0.65
ASCVD and selected SLE variables	0.69	0.64	0.70
CLASSIFICATION			
ASCVD only			
Low (<7.5%)	746 (60.02)	281 (23.59)	1076 (86.56)
Moderate (7.5-20%)	480 (38.62)	281 (23.59)	154 (12.39)
High (>20%)	17 (1.37)	629 (52.81)	13 (1.05)
ASCVD and selected SLE variables			
Low (<7.5%)	885 (71.2)	290 (24.35)	973 (78.28)
Moderate (7.5-20%)	316 (25.42)	549 (46.1)	241 (19.39)
High (>20%)	42 (3.38)	352 (29.55)	29 (2.33)

Abbreviations: ASCVD, atherosclerotic cardiovascular disease; AUC, area under the curve; LASSO, least absolute shrinkage and selection operator

the performance of the traditional risk algorithm and identified a greater number of SLE patients (at least two-fold) at high risk for CVD events over 10 years.

POD03

Adherence to Serum Urate Monitoring Guidelines Among Older Adults With Gout in Ontario, Canada: A Population-Based Study

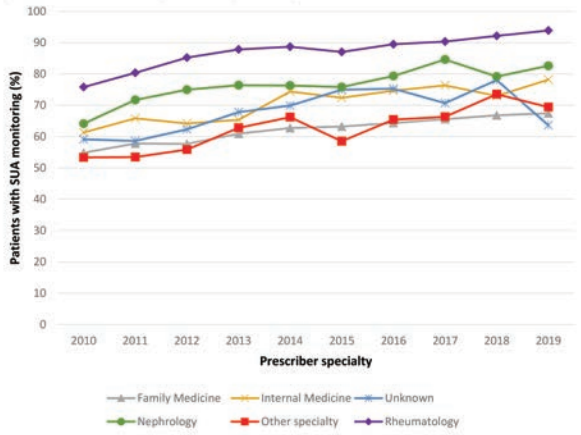
Timothy Kwok (Division of Rheumatology, Department of Medicine, University of Toronto, Toronto); Bindee Kuriya (Sinai Health System, University of Toronto, Toronto); Gillian Hawker (University of Toronto, Toronto); Ping Li (ICES, Toronto); Gregory Choy (University of Toronto, Toronto); Jessica Widdifield (Sunnybrook Research Institute, ICES, University of Toronto, Toronto)

Objectives: Serum uric acid (SUA) monitoring plays an important role in the treat-to-target recommendations of gout. Adherence to evidence-based SUA monitoring recommendations after initiation of urate-lowering therapy (ULT) is unknown. We assessed the proportion of older adults with gout undergoing SUA testing 6 months and 12 months after ULT initiation and associated patient and physician-level factors.

Methods: This population-based retrospective cohort study used Ontario health administrative databases. Patients aged ≥ 66 with a gout diagnosis and newly dispensed ULT between January 1, 2010, and March 31, 2019, were identified using the Ontario Drug Benefit and Ontario Health Insurance Plan (OHIP) databases. SUA tests were identified from the Ontario Laboratories Information System and OHIP databases. We characterized the proportion of patients that received SUA testing within 6 months and 12 months after ULT dispensation, overall and by prescriber specialty. Multilevel logistic regression clustered by ULT prescriber evaluated factors associated with SUA monitoring by 6 months including patient, prescriber characteristics, prescription information and healthcare usage factors.

Results: A total of 44,438 patients with mean (SD) age of 76.0 ± 7.3 years and 64.4% males were included. Family physicians prescribed 79.1% of all ULTs. Overall, SUA testing was lowest in 2010 (56.4% at 6 months and 69.5% at 12 months), and rose significantly over time to 71.3% and 79.6%, respectively, in 2019 ($P < 0.0001$). Compared with rheumatologists, family physicians (OR 0.26, 95% CI 0.23-0.29), internists (OR 0.34, 95% CI 0.29-0.39), nephrologists (OR 0.37, 95% CI 0.30-0.45) and other specialties (OR 0.25, 95% CI 0.21-0.29) were less likely to test SUA, as were male physicians (OR 0.87, 95% CI 0.83-0.91). Crude trends stratified by prescriber specialty for SUA monitoring by 6-months is detailed in Figure 1. Patient factors associated with lower odds of SUA monitoring included: rural residence (OR 0.81, 95% CI 0.77-0.86), lower socioeconomic status, as discerned based on patients' postal codes and census neighborhood income quintiles (OR 0.91, 95% CI 0.85-0.97) and patient comorbidities. Correlates of SUA monitoring included: chronic kidney disease (OR 1.40, 95% CI 1.32-1.49) hypertension (OR 1.11, 95% CI 1.04-1.18), diabetes (OR 1.17, 95% CI 1.12-1.22) and co-prescription of colchicine/oral corticosteroids (OR 1.31, 95% CI 1.23-1.40).

Figure 1. The proportion of patients with gout with SUA testing by 6-months after index ULT dispensation stratified by prescriber primary specialty



Conclusion: SUA monitoring is suboptimal among older adults with gout-initiating ULT but is improving over time. ULT prescriber, patient and prescription characteristics affected SUA monitoring. These findings suggest variations in quality care and the need to mobilize quality improvement activities in chronic gout management, as optimal monitoring may be associated with improved clinical outcomes. Best Abstract on Clinical or Epidemiology Research by a Trainee – Phil Rosen Award.

POD04

Comparison of Survival on Treatment Among New Users of Biosimilar Versus Originator Biologics in Inflammatory Arthritis: Population-Based Evidence From a Natural Experiment Due to a Policy Change

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Objectives: British Columbia (BC) health policy mandated that all new anti-TNF initiations after June 2017 use biosimilars when available, providing the context for a natural experiment. Our study objective was to compare drug survival (as a surrogate marker of effectiveness and safety) after initiation of etanercept and infliximab for inflammatory arthritis in new users of biosimilars vs originators, using historical controls pre-policy change.

Methods: Study Cohort: Using administrative health data, we identified all incident users of a new biologic (ie, without prior prescriptions over 6 months) with rheumatoid arthritis (RA), psoriasis or psoriatic arthritis (Pso/PsA), or ankylosing spondylitis (AS). The biosimilar cohort includes incident users starting etanercept or infliximab between 07/01/2017 and 12/31/2019, followed until 12/31/2020 (post-policy period).

Table 1. Discontinuation of biosimilar and originator anti-TNFs before and after policy change

1A. Discontinuation rates

Drug	Period	Discontinuation / N	Follow-up Years	Rate (per 100 person-year)
ADALIMUMAB	Pre (originator)	849 / 1786	2,477.05	34.27
	Post (originator)	1129 / 2255	3,029.03	37.27
ETANERCEPT	Pre (originator)	679 / 1308	1,750.16	38.80
	Post (biosimilar)	400 / 827	1,029.68	38.85
INFLIXIMAB	Pre (originator)	119 / 259	395.46	30.09
	Post (biosimilar)	158 / 299	410.63	38.48

1B. Hazard Ratio comparing discontinuation post- vs. pre- policy change

Drug	Univariate Cox PH		Multivariable Cox PH*	
	cHR (95%CI)	p value	aHR (95%CI)	p value
ADALIMUMAB	1.08 (0.99,1.19)	0.0826	1.07 (0.98,1.17)	0.1443
ETANERCEPT	0.96 (0.85,1.09)	0.5766	0.95 (0.84,1.09)	0.4756
INFLIXIMAB	1.18 (0.94,1.49)	0.1601	1.14 (0.90,1.44)	0.2947

1C. Ratio of Hazard Ratios**

	Univariate Cox PH		Multivariable Cox PH*	
	Ratio of cHR (95%CI)	p value	Ratio of aHR (95%CI)	p value
ETANERCEPT	0.89 (0.76,1.04)	0.1435	0.89 (0.76,1.04)	0.1536
INFLIXIMAB	1.09 (0.85,1.40)	0.5045	1.06 (0.82,1.37)	0.6455

Abbreviations: cHR: crude HR. aHR: adjusted HR, p value is from Wald test of hazard ratio=1 or ratio of hazard ratio=1 (i.e., no difference in drug discontinuation rate).

*Adjusted for age, sex, socio-economic status, rural vs urban residence, health authority, arthritis type, arthritis duration, number of prior biologic agents, comorbidities at anti-TNF initiation, and steroid and conventional DMARDs use.

**Ratio of Hazard Ratios denotes the ratio of hazard ratio for etanercept or infliximab to the corresponding one for adalimumab in Table 1.B. As such, Ratio of Hazard ratio is the exponential of difference-in-difference of log hazard rate for discontinuation, representing the differences in drug survival outcomes for biosimilar vs. originator new users of etanercept or infliximab, net from the temporal trend effect (adalimumab post- vs. pre-policy change period).

Historical controls include all incident users of etanercept/infliximab originators between 01/01/2014 and 06/30/2016, followed until 06/30/2017 (pre-policy period). To control for potential temporal trends, we selected new users of adalimumab (no biosimilar available over the same time periods) as a comparison group. Outcome: Discontinuation was defined as no prescription renewal for at least 6 months. Statistical analyses: People were followed from anti-TNF initiation until discontinuation or censoring due to death, moving out-of-province, or end of follow-up, whichever occurred first. Discontinuation rates (per 100 person-year) were calculated. To deal with nonproportional hazards, we applied weighted Cox Proportional Hazard Models to estimate the adjusted hazard ratio (aHR) of discontinuing anti-TNFs, in people who started a biosimilar vs the respective originator, after controlling for potential confounders (Table 1). To control for temporal trend, we employed the difference-in-difference (DID) method, comparing drug survival among new users of biosimilar vs originator etanercept/infliximab with new users of adalimumab post- vs pre-policy change. The DID computes the difference between the aHRs logarithms for etanercept/infliximab and for adalimumab, reported as the ratio of the two aHRs in Table 1C.

Results: Our sample includes 827 biosimilar etanercept users (RA: 556, AS: 178, Pso/PsA: 93) and 299 infliximab users (RA: 154, AS: 67, Pso/PsA: 78); 1308 etanercept and 259 infliximab originator users; and 2255 adalimumab originator users post- and 1786 pre-policy change periods. Discontinuation rates are described in Table 1A. After adjusting for baseline covariates (Table 1B), and after accounting for temporal trends (Table 1C), the likelihood of discontinuation was similar for biosimilar vs originator etanercept and infliximab users.

Conclusion: Real-world population-based data in BC shows that biosimilar etanercept and infliximab have comparable duration of treatment to the originators in incident users for inflammatory arthritis. Supported by a CIORA grant.

POD05

Hospitalization With Infection in Offspring Exposed During Late Pregnancy to Tumor Necrosis Factor Inhibitors With High Versus Low Placental Transfer Ability

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Objectives: During pregnancy, best practice guidelines suggest discontinuing tumor necrosis factor inhibitors (TNFi) with high placental transfer before or during the third trimester if the maternal disease is well controlled. This recommendation stems from concerns that TNFi, which can cross the placenta, could cause immunosuppression in the offspring, particularly in the third trimester, when the placental transfer of maternal IgG is highest. However, there is limited evidence on the risk of serious infections by TNFi subtypes, particularly following TNFi administration during late pregnancy. We evaluated the risk of serious infections in offspring born to mothers with chronic inflammatory diseases who used TNFi with high versus low placental transfer during late pregnancy (ie, within 12 weeks before delivery).

Methods: In this retrospective cohort study, we identified singleton offspring born alive between 2011 and 2019 to women with a prior diagnosis of rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis, psoriasis, and/or inflammatory bowel disease (IBD) in MarketScan commercial data from the United States. TNFi exposure was defined as ≥ 1 filled prescription and/or infusion procedure code within 12 weeks prior to delivery. TNFi exposure was further categorized into high (ie, infliximab, adalimumab, golimumab) and low (ie, certolizumab, etanercept) placental transfer. Serious infections were ascertained based on ≥ 1 hospitalization with infection as the primary diagnosis in the offspring's first year. We performed multivariable Cox proportional hazards models, adjusting for maternal age at delivery, chronic inflammatory disease diagnosis, maternal comorbidities, pregnancy complications, and concomitant in-utero drug exposures to immunosuppressives/steroids.

Results: We identified 26,088 offspring, among whom 1,708 (6.5%) were exposed to TNFi within 12 weeks prior to delivery. Of the 1,708 with TNFi exposure, 1,325 (77.6%) and 383 (22.4%) had high and low placental transfer drugs, respectively. Serious infections occurred in 2.1% of offspring exposed to TNFi with high placental transfer versus 1.6% with low placental transfer. In multivariable analyses of TNFi exposures within 12 weeks of delivery, the adjusted hazard ratio for serious infections comparing high versus low placental transfer TNFi was 0.98 (95% CI 0.36, 2.61) (unadjusted 1.32; 95% CI 0.54, 3.18).

Conclusion: In this large population sample reflecting real-world TNFi use during late pregnancy, we were unable to identify a clear increased risk of serious infections in the first year of life in offspring exposed to high versus low placental transfer, although the confidence interval around our estimate was wide. This suggests the need for further research to improve the evidence base of guidelines in this regard. Best Abstract by a Post-Graduate Research Trainee Award.

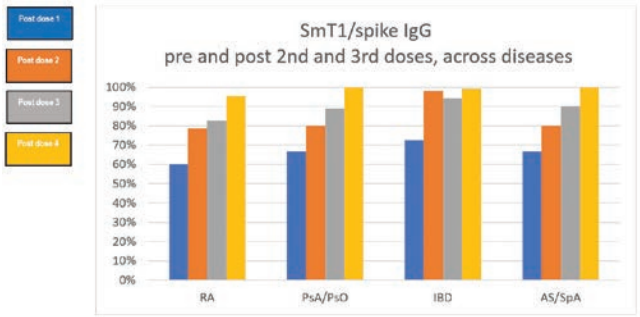
POD06

Immunogenicity of COVID-19 Vaccines in Immune-Mediated Inflammatory Diseases (IMID): Preliminary Results From the First 1251 SUCCEED Patients

Gilaad Kaplan (University of Calgary, Calgary); Dawn Bowdish (McMaster University, Hamilton); Maggie Larche (McMaster University, St Joseph's Healthcare Hamilton, Hamilton); Antonio Avina-Zubieta (University of British Columbia Faculty of Medicine; Arthritis Research Canada, Vancouver); Paul Fortin (Division of Rheumatology, Department of Medicine, CHU de Québec - Université Laval, Québec); Anne-Claude Gingras (Lunenfeld-Tanenbaum Research Institute, Toronto); Vinod Chandran (Krembil Research Institute, Toronto Western Hospital, Toronto); Roaya Dayam (Lunenfeld-Tanenbaum Research Institute, Toronto); Gilles Boire (Université de Sherbrooke, Sherbrooke); Diane Lacaille (Arthritis Research Canada, University of British Columbia, Vancouver); Daniel Pereira (University Health Network, Toronto); Ines Colmegna (The Research Institute of the MUHC, Montreal); Jennifer Lee (RI-MUHC, Montreal); Barbara Baker (McMaster University, Hamilton); Ker-Ai Lee (University of Waterloo, Department of Statistics and Actuarial Science, Waterloo); Richard Cook (University of Waterloo, Department of Statistics and Actuarial Science, Waterloo); Joshua Quan (University of Calgary, Calgary); Nastaran Sharifi (University of Calgary, Calgary); Dawn Richards (Canadian Arthritis Patient Alliance, Toronto); Nathalie Amiable (CHU de Québec-Université Laval Research Center, Quebec); Sophie Roux (Université de Sherbrooke, Sherbrooke); Jenna Benoit (McMaster University, Hamilton); Carol Hitchon (University of Manitoba, Winnipeg); Sasha Bernatsky (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Montreal); SUCCEED Investigators Safety and immunogenicity of COVID-19 vaccines in systemic immune-mediated inflammatory Diseases (Montreal)

Objectives: SUCCEED was funded by the Government of Canada's COVID Immunity Task Force (CITF) in 2021, to study COVID vaccination in IMID. We present early data, including antibody production post-vaccine, and time trends for serologic evidence of recent infection.

Methods: From Vancouver, Calgary, Winnipeg, Montreal, Quebec City, Sherbrooke, Toronto, and Hamilton clinics, baseline and follow-up questionnaires and dried blood spots (or sera) pre- and post-COVID vaccination have been collected from consenting adult patients with rheumatoid arthritis (RA), inflammatory bowel disease (IBD), ankylosing spondylitis/spondyloarthritis (AS/SpA) and psoriasis/psoriatic arthritis (PsO/PsA).



We measured SARS-CoV-2 antibody responses post-first and subsequent vaccine doses; assays evaluated for the presence of anti- SmT1/spike IgG (by electrochemiluminescence immunoassay) as an indicator of immune response to vaccine. Anti-nucleocapsid IgG was also measured, as an indicator of recent infection. Seropositivity in each case was defined as surpassing the 1% false reporting rate cutoff. We describe the first 1251 SUCCEED participants recruited from Vancouver, Calgary, Hamilton, Quebec City, Toronto, and Sherbrooke. We present serology for the first 986 samples processed.

Results: Two-thirds of SUCCEED participants were female, and 80% were White. At recruitment, mean age was 53.8 (median 55.2, interquartile range 42.2-65.9) years and median IMID duration was 12.9 years. Pfizer vaccine accounted for 75% of first and second doses, and 66% of third doses. Moderna accounted for 18% of first, 22% of second, and 33% of third doses. Fourth doses were equally distributed between Pfizer and Moderna vaccines. AstraZeneca vaccines represented 7% of first and 2% of second vaccinations; other vaccine types were negligible. Serology for SmT1/spike IgG was positive in 97.1 percent (95% CI 94.8, 98.4) of samples post-second dose vaccine, 97.7 percent (95% CI 95.8, 99.0) of samples post-third dose, and 100% of samples post-fourth dose. Results were similar across IMIDs, with trends for highest positivity in IBD (Figure 1). Prior to emergence of the Omicron variant, anti-N positivity (indicating recent infection) was as low as 3% (95% CI 2, 6%) across all IMID, and post-Omicron as high as 11% (95% CI 5, 21%).

Conclusion: The vast majority of SUCCEED participants demonstrated anti- SmT1/spike IgG post-second dose, and after additional doses. Evaluation of cellular immunity (also funded by CITF) will complement these results, as will additional analyses of IgG decay over time, and of how medications and other factors affect results. These data are the first to highlight calendar trends for recent COVID infections in a large, pan-Canadian IMID sample.

POD07

A Unique Glycan Polysialic Acid Is Highly Expressed in Patients With Aggressive Systemic Sclerosis

Lamia Khan (University of Alberta, Edmonton); Tahlia Derksen (University of Alberta, Edmonton); Desiree Redmond (University of Alberta, Edmonton); Jan Tervaert (University of Alberta, Edmonton); Mohamed Osman (University of Alberta, Edmonton); Lisa Willis (University of Alberta, Edmonton)

Objectives: Systemic sclerosis (SSc) is a rare but deadly disease characterized by progressive fibrosis, immune dysregulation and vasculopathy. Among all rheumatic diseases, SSc continues to have the highest level of disease-associated morbidity and mortality. Early in the disease, SSc patients develop severe rapidly progressive early diffuse (edSSc) or less progressive early limited SSc (elSSc). The primary cells promoting fibrosis in SSc are human dermal fibroblasts (HDFs) which develop a myofibroblast phenotype associated with cancer-like resistance to apoptosis and increased invasive properties. In cancer, the glycan polysialic acid (polySia) is preferentially expressed in and secreted from highly metastatic cells, and its expression is associated with a poor prognosis. Therefore, we hypothesized that HDF from patients with SSc (particularly edSSc) have a dysregulation in polySia expression, and polySia levels are elevated in their serum.

Methods: All our SSc patients met the inclusion criteria of 2013 ACR/EULAR. Primary HDF from healthy controls (HC), elSSc, or edSSc was generated using 4-mm skin punch biopsy. Low passage (< P5) cultured HDFs were used for the subsequent experiments. PolySia levels were measured in each group using immunofluorescence microscopy and immunoblotting. Additionally, mRNA expression of the enzymes regulating polySia biosynthesis (ST8Sia2 & 4) were measured via qRT-PCR. To determine the association between polySia and fibrotic signals, HDFs from HC was treated with the profibrotic cytokine TGF-beta, then the expression level of polySia, ST8Sia2 & 4 were measured. Finally, serum polySia was measured using a novel ELISA assay.

Results: We found that baseline polySia expression was markedly increased in HDF and dermal sections from patients with severe edSSc compared to elSSc and HC. This was associated with increased mRNA expression of ST8Sia2 & 4 enzymes. Exogenous TGF-beta treatment increased the expression of polySia and associated enzymes in HDFs from HC. Interestingly, edSSc patients also had higher levels of polySia in their serum – suggesting a potential role for polySia as a novel biomarker in SSc.

Conclusion: Patients with edSSc have increased levels of polySia and its synthetic enzymes ST8Sia2 & 4. This novel polySia signature may correlate with the fibrotic pathway and the progression of aggressive SSc in patients. Further studies are needed to explore the functional role of polySia such as resistance to apoptosis and immune dysregulation in the pathogenesis of SSc. Our findings may suggest a role for polySia as a future biomarker and therapeutic target for patients with SSc. Funding: Dutch Kidney Foundation, Arthritis Society, Scleroderma Canada, GlycoNET.

POD08

The Association Between Systemic Lupus Erythematosus (SLE) and Bone Mineral Density (BMD) Polygenic Risk Scores With Lumbar Spine BMD Z-Score in Childhood-Onset SLE Patients: A Retrospective Cohort Study

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Objectives: Systemic lupus erythematosus (SLE) is a chronic autoimmune disease. Genetics play a role in SLE susceptibility, with > 100 risk single nucleotide polymorphisms (SNPs) from genome wide association studies (GWAS). Childhood-onset SLE patients < 18 years (cSLE) are at risk for reduced bone mineral density (BMD) due to disease activity and chronic glucocorticoid exposure. Our aim was to assess the genetic contribution to bone mineral density among a multiethnic cSLE cohort.

Methods: All patients were diagnosed and followed at the SickKids Lupus Clinic. Patients were genotyped on the Multiethnic Genotyping Array or the Infinium Global Screening Array. Those with baseline Lumbar Spine (LS) BMD dual-energy X-ray absorptiometry (DXA) scan were included in analysis. Baseline was defined as 1 month prior, or up to one year after cSLE diagnosis. Patients with bony abnormalities or with DXAs due to medical conditions other than SLE were excluded. We extracted demographics,

clinical features, and medication use from the Lupus database. The main outcome of interest was LS (L1-L4) BMD z-scores. [ES1] [VM2] Two weighted polygenic risk scores (PRSs) were calculated. (1) BMD PRS was calculated using alleles associated with low LS from the largest LS BMD meta-GWAS of BMD to date. (2) SLE PRS was also calculated using largest SLE GWAS conducted to date. We regressed BMD and SLE PRSs with baseline BMD z-scores in linear models adjusted for sex, ancestry, glucocorticoid exposure, height percentile, and an indicator for lupus nephritis and/or neuropsychiatric lupus.

Results: Our study included 284 patients, 82% female, 29% of European and 28% of East Asian ancestry. The median age of cSLE diagnosis was 13.5 years (IQR 11.1, 15.3). In univariate and multivariate adjusted models, a higher BMD PRS was significantly associated with low BMD z-score (β: −0.75; 95% CI −1.32, −0.18; $P = 0.01$, multivariable model). There was no association between SLE PRS and LS BMD z-score. Using steroids prior to DXA was significantly associated with low BMD at a univariate level but was not significant in the adjusted model. Height percentile [ES3] was significantly associated with BMD z-score (β: 0.01; 95% CI 0.01, 0.02; $P = 2.39e-10$), yet the presence of LN and/or NPSLE was not (β: 0.04; 95% CI -0.22, 0.31; $P = 0.76$ [ES4]).

Conclusion: We found that a high BMD PRS was significantly associated with lower LS BMD z-score in cSLE patients at baseline. BMD PRS may be used to stratify patients with cSLE who are at greatest risk of reduced BMD.

POD09

Exploring Levels of Protein Biomarkers in Response to Treatment for Psoriasis and Psoriatic Arthritis

Rachel Offenheim (Schroeder Arthritis Institute, Toronto); Darshini Ganatra (Krembil Research Institute, University Health Network, Toronto); Mitchell Sutton (Toronto Western Hospital, Toronto); Dafna Gladman (Krembil Research Institute, Toronto Western Hospital, Toronto)

Objectives: The objective of this study was to evaluate the levels of CXCL10, MMP3, S100A8, CCL2, and ACP5 in serum of psoriasis and PsA patients before and after treatment with biologic agents (TNFi and IL-17i).

Methods: PsA and PsC patients are followed prospectively at the Toronto Western Hospital psoriatic disease clinic (Table 1). We identified 93 PsA patients on TNFi and 22 on IL-17 inhibitors (IL-17i) and retrieved serum samples before and after therapy. Samples from 30 patients with PsC treated with biologics were matched to 30 patients not treated with biologics were also retrieved from the databank. Using the Luminex Discovery assay we measured CXCL10, MMP3, S-100A8, CCL2, and ACP5 levels. Statistical analysis was performed using Wilcoxon signed-rank test.

Results: CXCL10 ($P = 0.0007$), MMP3 ($P < 0.0001$), S100A8 ($P < 0.0001$), ACP5 ($P < 0.0001$), and CCL2 ($P = 0.01$) significantly decreased after TNFi treatment in PsA patients. CXCL10 ($P = 0.04$) and ACP5 ($P = 0.02$) significantly increased after IL-17i treatment in PsA patients. There were no significant differences between treated and untreated PsC patients.

	PsA (n=115)	PSC Treatment (n=30)	PsC Non-treatment (n=30)
Age	49.90 (12.65)	47.53 (14.88)	47.47 (15.64)
Sex (% male)	66 (56.41%)	17 (56.67%)	17 (56.67%)
disease duration PsA	11.17 (10.56)	N/A	N/A
disease duration Ps	22.12 (13.96)	22.40 (13.91)	22.21 (13.50)
joint count baseline	5.97 (6.40)	N/A	N/A
joint count treatment	3.05 (5.51)	N/A	N/A
PASI Score baseline	4.80 (7.88)	N/A	5.39 (4.40)
PASI score treatment	3.42 (6.41)	7.02 (8.70)	N/A
DAPSA score baseline	29.47 (23.26)	N/A	N/A
DAPSA score treatment	17.22 (12.61)	N/A	N/A

Conclusion: CXCL10, MMP3, S100A8, ACP5, and CCL2 are potential biomarkers for response to TNFi in PsA patients. CXCL10 and ACP5 are potential biomarkers for response to IL-17i treatment in PsA patients.

POD10

Neutrophil Extracellular Traps as a Biomarker to Predict Outcomes in Lupus Nephritis

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Objectives: Determine if the amount of NET complexes (Elastase-DNA and HMGB1-DNA) in serum at the time of a LN flare predicts renal outcomes in the following 24 months.

Methods: The study had 2 stages. In an exploratory cohort composed of active SLE (clinical SLEDAI ≥ 1), inactive SLE and healthy controls (HC), we assessed the association between Elastase-DNA and HMGB1-DNA complexes and ALN. A separate LN cohort was then used to determine the utility of NET complexes to predict renal outcomes over the subsequent 24 months. All patients had ALN (24-hour urine protein > 500 mg with a subsequent modification in therapy by the treating physician), a baseline eGFR > 30 mL/min (3 months prior to the flare), stored serum sample ± 3 months from the renal flare and 2-years follow-up. The following outcomes were ascertained: complete response (CR) defined as proteinuria < 500 mg/day and a serum creatinine within 15% of the baseline; severe renal impairment (eGFR ≤ 30 mL/min) and the percentage decline in the eGFR over the 24 months after flare.

Table 1. Logistic Regression analysis. Higher levels of NET complexes at the time of the flare increase the odds of non-response to therapy and severe renal impairment at 24 months from the LN flare **(N=109)**

	12 months after renal flare		24 months after renal flare	
Variables (at baseline, ±3 months from the LN flare)	**Odds Ratio (95% CI)**	**P value**	**Odds Ratio (95% CI)**	**P value**
Failure to achieve complete renal response*				
Elastase-DNA[a]	1.71 (1.04-2.92)	**0.04**	1.85 (1.13-3.03)	**0.01**
Elastase-DNA, 75 cut-off	3.07 (1.07-8.82)	**0.03**	3.90 (1.35-11.28)	**0.01**
HMGB1-DNA[a]	2.33 (1.02-5.33)	**0.04**	2.24 (1.08-4.65)	**0.03**
HMGB1-DNA, 75 cut-off	3.16 (1.07-9.34)	**0.03**	1.64 (1.09-2.48)	**0.02**
Elastase-oxDNA	0.53 (0.27-1.06)	0.07	0.63 (0.34-1.15)	0.13
24-hour proteinuria	1.77 (0.82-3.79)	0.13	1.11 (0.55-2.24)	0.75
Anti dsDNA ab	1.71 (0.79-3.65)	0.16	1.29 (0.70-2.37)	0.40
C3	0.77 (0.46-1.27)	0.31	0.71 (0.43-1.17)	0.18
C4	0.96 (0.58-1.79)	0.88	0.87 (0.50-1.49)	0.62
Presence of severe renal impairment (eGFR≤30ml/min)**				
Elastase-DNA[a]	1.37 (0.93-2.01)	0.10	1.60 (1.18-2.18)	**0.002**
Elastase-DNA, 105 cut-off	1.29 (0.12-1.35	0.82	6.57 (1.17-36.0)	**0.03**
HMGB1-DNA[a]	1.47 (1.03-1.96)	**0.02**	1.51 (1.12-2.04)	**0.006**
HMGB1-DNA, 90 cut-off	0.90 (0.09-9.20)	0.96	3.22 (0.54-19.00)	0.19
Elastase-oxDNA	1.41 (0.17-1.13)	0.74	0.79 (0.08-2.77)	0.80
Proteinuria	1.52 (0.36-6.33)	0.56	0.94 (0.27-3.21)	0.92
Anti dsDNA ab	0.69 (0.11-4.05)	0.68	1.99 (0.78-5.0)	0.14
C3	2.73 (0.83-9.0)	0.09	1.12 (0.44-2.81)	0.80
C4	1.52 (0.77-2.97)	0.22	0.98 (0.45-2.09)	0.96

*The logistic regression analysis assessing response to treatment was adjusted for ethnicity, immunosuppressive therapy received in the prior 3 months, history of a prior LN flare and serum creatinine at the moment of the flare.

**Logistic Regression analysis assessing development of severe kidney damage was adjusted for ethnicity and creatinine at the moment of the flare.

[a] NET complexes were assessed as a quantitative variable; the odds expressed are for every 100Ui/ml increase in the NET complex levels.

Results: 92 individuals were included in the exploratory cohort (49 active, 23 inactive SLE and 20 HC). NET complexes were significantly higher in SLE patients compared to HC ($P < 0.0001$ for both complexes). Patients with ALN (36.7%) had significantly higher levels of NET complexes compared to active SLE without LN ($P = 0.03$ and $P = 0.02$, Elastase-DNA and HMGB1-DNA respectively). Furthermore, the NET complex levels were higher in proliferative LN vs nonproliferative LN ($P = 0.008$ and $P = 0.001$, Elastase-DNA and HMGB1-DNA respectively). The LN cohort included 109 ALN patients. The median age was 29 years, 84% were women, 37.9% were Caucasian, 22.2% Black and 17.5% Asian, the baseline eGFR was 112 mL/min. 77.9% had a kidney biopsy at the time of the LN flare, of whom 55.9% had a proliferative or mixed class, 17.4% class V, and 4.5% class I or II. Patients with higher baseline levels of NET complexes had higher odds of not achieving CR and of having severe renal impairment after 24 months of the flare, outperforming conventional biomarkers (Table 1). There was a linear relationship between the amount of baseline Elastase-DNA and HMGB1-DNA complexes and the decline in renal function in the subsequent 24 months ($P < 0.0001$ and $P = 0.002$, Elastase-DNA and HMGB1-DNA, respectively).

Conclusion: Elastase-DNA and HMGB1-DNA complexes predicted renal outcomes, including response to therapy and decline in kidney function at 2 years after the LN flare. Best Abstract on SLE Research by a Trainee – Ian Watson Award.

POD11

"If You Didn't Chart It, You Didn't Do It": Developing a Template to Address Quality Indicators in Patients With Childhood-Onset Systemic Lupus Erythematosus (cSLE) Transitioning From Pediatric to Adult Care

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Objectives: Transition from pediatric to adult care is a period of high risk for patient attrition, poor adherence, and disease flare. We established a dedicated Young Adult SLE (YASLE) clinic with a goal of optimizing care for these complex patients, including addressing established SLE quality metrics. We noted that these metrics were infrequently documented, and thus assumed unaddressed. Here we assess the impact of the implementation of a semistructured clinical note template in addressing quality metrics more consistently.

Methods: Retrospective chart review was conducted for all cSLE graduates who transitioned from The Hospital for Sick Children to Mount Sinai Hospital for adult care since YASLE clinic inception in August 2016 until Dec 2021. At baseline (August 2016–November 2018), clinical notes were untemplated. The 1st template iteration, incorporating prompts about some quality indicators, was utilized from December 2018–June 2019, with further iterations (2nd: July 2019–February 2021; 3rd: March 2021–December 2021) incorporating further quality indicators. Each visit was analyzed for address (yes/no/no data/not applicable) of medication adherence, health maintenance and monitoring strategies (vaccinations, antimalarial-associated ocular health, sun hygiene, bone health, medication adherence), and psychosocial parameters (sexual health, contraception, mood, supports, habits). Descriptive statistics were used to analyze proportion of visits in which discussion surrounding each of these indicators was documented, grouped by date of visit/template iteration.

Results: There was significant increase in proportion of clinical notes which documented the selected quality indicators as they were incorporated into the template. By 3rd iteration, 97% (316/326) of applicable 3rd iteration visits documented patient-reported medication adherence, compared to 36% (32/88) at baseline ($P < 0.0001$). Ninety-seven percent (308/316) of applicable visits documented antimalarial-related ocular screening, 95% (314/330) sun hygiene, and 84% (278/330) influenza vaccination, compared to 31% (26/83), 11% (10/89), and 34% (n = 30/89) at baseline, respectively ($P < 0.0001$ each). Similarly, documentation of bone density testing increased from 12% (11/89) to 95% (315/330) ($P < 0.0001$). The only metric for which documentation did not significantly increase from baseline was blood pressure reading in clinic, as baseline documentation was 100%.

Conclusion: There was significantly increased frequency of documenting quality indicators since implementing a semistructured clinical template in the YASLE clinic. This increased documentation reflects a critical first step in their consistent address which, in turn, can translate to improved quality of care delivered. The success of this template could serve as a proof-of-concept, and be implemented by other clinics, adapted to suit the needs of their patients. Best Abstract on Quality Care Initiatives in Rheumatology Award.

POD12

Treatment Patterns of Scleroderma Renal Crisis in the International Scleroderma Renal Crisis Survey II

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Objectives: Scleroderma renal crisis (SRC) is a life-threatening complication of systemic sclerosis characterized by acute kidney injury, hypertension and microangiopathic hemolytic anemia. Prompt control of blood pressure remains the mainstay of therapy in SRC. Due to the rarity of SRC, there is limited information regarding the treatment patterns of SRC in real-world settings. We are conducting an international study to develop classification criteria for SRC.

Table 1: Medication used for treatment of scleroderma renal crisis

Anti-hypertensives, n(%)	
Angiotensin-converting enzyme inhibitor	92 (95.8%)
Captopril	46
Ramipril	21
Enalapril	10
Lisinopril	9
Perindopril	4
Trandolapril	1
Unspecified	1
Calcium channel blocker	75 (78.1%)
Amlodipine	40
Nifedipine	23
Diltiazem	4
Verapamil	3
Lercanidipine	3
Nicardipine	1
Unspecified	1
Angiotensin Receptor Blocker	10 (10.4%)
Losartan	7
Valsartan	2
Candesartan	1
Iloprost	12 (12.6%)
Diuretic	11 (11.5%)
Bosentan	10 (10.4%)
Alpha-1 Blocker	10 (10.4%)
Alpha-2/imidazoline receptor agonist	8 (8.3%)
Beta-blockers	7 (7.3%)
Other	6 (6.3%)
Adjuvant Therapies, n(%)	
Eculizumab	3 (3.1%)
Mycophenolate	2 (2.1%)
Plasmapheresis	1 (1.0%)
IVIg	1 (1.0%)
Cyclophosphamide	1 (1.0%)
Prednisone	1 (1.0%)
Dialysis	42 (43.8%)

In this setting, we collected data on treatment of new-onset SRC. Here, we propose to describe real-world treatment patterns of new-onset SRC.

Methods: In January 2020, the Scleroderma Clinical Trials Consortium (SCTC) Scleroderma Renal Crisis Working Group launched a two-year rolling, web-based survey among 114 collaborators in 28 countries. Collaborators who identified new SRC cases were sent a detailed questionnaire to collect standardized clinical data. Information collected on the treatment of SRC included: antihypertensive medications, adjuvant therapy, and time required to control blood pressure.

Results: Of the 96 SRC cases identified during the study period, angiotensin-converting enzyme inhibitors (ACEi) were used to treat SRC in 96% (92/96), calcium channel blockers in 78% (75/96) and angiotensin II receptor blockers in 10% (10/96) of cases (Table 1). At the time of SRC onset, 10 patients were already on ACEi and either had their ACEi dosage increased (4/10), changed to a different ACEi (3/10) or continued the same (3/10). Other antihypertensives included iloprost (12/96), diuretics (11/96), bosentan (10/96), alpha-1 blockers (10/96), alpha-2/imidazoline receptor agonists (8/96), beta-blockers (7/96) and others (6/96). The number of patients requiring one, two, three, or four or more classes of antihypertensive to control blood pressure were 14 (15%), 42 (44%), 20 (21%) and 19 (20%), respectively. Adjuvant therapies included eculizumab (3/96), mycophenolate (2/96), plasmapheresis (1/96), IVIg (1/96), cyclophosphamide (1/96) and prednisone (1/96). The median time to control blood pressure was 6 (IQR 7) days. A total of 42 (43.8%) patients required dialysis.

Conclusion: This is the first description of SRC real-world treatment patterns using prospectively collected data from an international cohort. We found that the majority of SRC patients required 2 or more antihypertensive medications to control blood pressure, with calcium channel blockers being the most commonly used second-line class of antihypertensive, and that time to control blood pressure was suboptimal.

POD13

Prediction of Psoriatic Arthritis Tool (PRESTO): Development and Performance of a New Scoring System for Psoriatic Arthritis Risk

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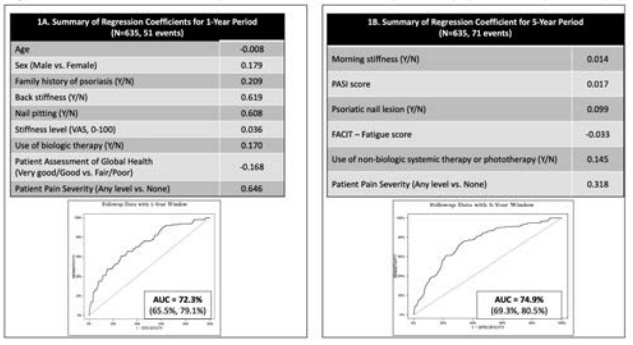
Objectives: Up to a third of patients with psoriasis develop psoriatic arthritis (PsA). A simple, scalable tool that identifies psoriasis patients at high risk for developing PsA could improve early detection and facilitate early intervention. Our overall objective is to develop an accurate risk prediction model for the development of PsA and to assess its performance among patients with psoriasis.

Methods: In this longitudinal cohort study we analyzed data from the International Psoriasis and Arthritis Team (IPART) study, a prospective cohort of psoriasis patients without PsA at the time of enrollment. The participants were followed prospectively from 2006 to 2020, and their PsA status was assessed annually by a rheumatologist. Information about their demographics, psoriasis characteristics, comorbidities, medications and musculoskeletal symptoms was used to develop prediction models for PsA. Penalized binary regression models were used for variable selection while adjusting for psoriasis duration; the stacked LASSO with equal weights was adopted to deal with multiple imputed datasets for incomplete data. Risks of developing PsA over 1- and 5-year time horizons were estimated. Internal validity was assessed using 5-fold cross-validation. Model performance was assessed by the area under the curve (AUC), and calibration plots.

Results: A total of 635 psoriasis patients were analyzed (mean duration of follow-up 7.7 years). 51 and 71 patients developed PsA during the 1-year and 5-year periods, respectively. The risk of developing PsA within 1 year was associated with younger age, male sex, family history of psoriasis, back stiffness, nail pitting, level of stiffness, use of biologic medications, global health and pain severity (AUC 72.3, 95% confidence interval (CI) 65.5, 79.1, Figure 1A). The risk of developing PsA within 5 years was associated with morning stiffness, psoriatic nail lesion, psoriasis severity (by PASI), fatigue severity (by FACIT-fatigue), pain severity and use of systemic nonbiologic medication or phototherapy (AUC 74.9, 95% CI 69.3, 80.5, Figure 1B). Calibration plots showed reasonable agreement between predicted and observed probabilities. The sensitivity and specificity for a 2.5% probability of PsA onset within 1 year were 54.5% and 75%, respectively. The sensitivity and specificity for a 5% probability of PsA onset within 5 years period were 61.1% and 77%, respectively.

Conclusion: The development of PsA within clinically meaningful time frames can be predicted with reasonable accuracy for psoriasis patients. Additional work is underway to validate these models in external cohorts of psoriasis patients.

Figure 1: Prediction Models for the Development of PsA in Psoriasis Within 1-year Period (1A) and Within 5-year Period (1B)



POD14

More Than Half of Canadians With RA With a Lifetime History of Mood Disorders Were Anxious or Depressed During the COVID-19 Pandemic

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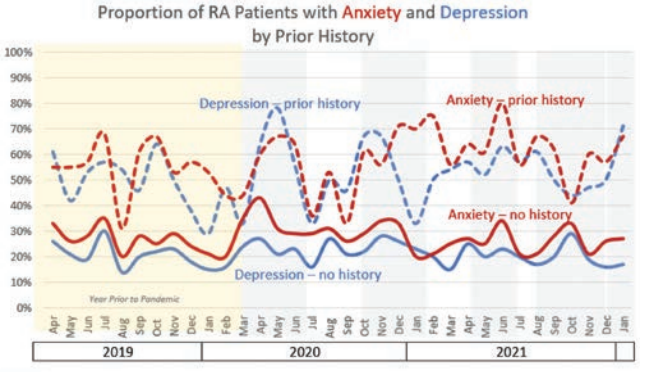
Objectives: Chronic stress and chronic disease are risk factors for anxiety and depression. In Canadians with RA, pandemic-related stress was



exacerbated by delayed access to vaccines, periodic lockdowns, and initial uncertainty about medication access. We compared trends in the prevalence of anxiety and depression prior to and during the first 22 months of the pandemic in RA patients with and without a lifetime history of these disorders.

Methods: The Canadian Early Arthritis Cohort (CATCH) is a prospective multicenter inception cohort of adults with RA across Canada. Prior to the pandemic, participants completed PROs and rheumatologists conducted assessments during in-person visits. After March 2020, ongoing PRO collection continued at in-person and remote visits. We estimated monthly trends in the prevalence of anxiety and depression (PROMIS Depression and Anxiety 4a score ≥ 55) from all visits between Mar 2019–Jan 2022 and compared rates for the year prior to (3/19-2/20) and first 23 months of the pandemic (3/20-1/22) stratified by lifetime history of mood disorders.

Results: 4148 visits were completed from 2/19 to 1/22 in 1,644 patients with a mean (SD) age of 60 (14) and disease duration of 6 (4) years; 73% were women, 84% White, 60% had post-secondary education, and 77% were in CDAI REM/LDA prior to the pandemic. 253 (15%) reported a history of depression and 217 (13%) of anxiety; 8% reported prior treatment. During the pandemic, as compared to those reporting no history, patients with a history had > 2X the prevalence of depression [55% vs 22%] and anxiety [59% vs 28%]. A similar pattern was seen in the year prior to the pandemic [depression: 49% vs 20%; anxiety 55% vs 26%]. During the first 22 months of COVID-19, depression and anxiety increased in all groups. Proportions were highest during COVID waves, and in patients with a previous history (Figure). Whereas depression peaked early in the pandemic, anxiety generally increased with each wave, peaking in Wave 3 (May-Jun 2021).

Conclusion: Anxiety and depression were common in CATCH participants before and during the pandemic. Participants reporting a lifetime history of mood disorders were more than twice as likely to report anxiety and depression; depression peaked early in the pandemic and anxiety grew with successive waves. The results demonstrate the importance of applying a lifetime perspective as previous episodes of anxiety and depression may be an important marker of increased vulnerability and recurrence in RA patients.

POSTER TOURS

TOUR01

Sex Differences in Employment Outcomes in Patients With Recent-Onset Rheumatoid Arthritis

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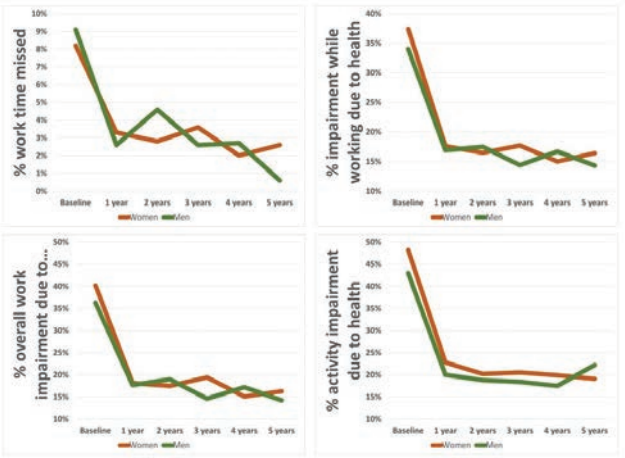
Objectives: To describe sex differences in work status and work productivity over time in newly diagnosed RA patients and to identify factors associated with work cessation.

Methods: Between November 2011 to March 2020, 945 early RA patients (< 1 year of symptoms at baseline) reported work status (employed or not employed), reasons for stopping work (RA, retirement, other) and work productivity [Work Productivity and Activity Index (WPAI)] annually over the first five years of follow-up. WPAI scores for overall work productivity loss, absenteeism (time away from work), presenteeism (reduced productivity at work) and general activity are expressed as impairment percentages (%) with higher numbers indicating greater impairment and less productivity. GEE regression models estimated associations of sociodemographic and disease-related variables with stopping work due to RA or early retirement (retiring before age 65). Analyses were stratified by sex. Odds ratio (OR) and 95% confidence intervals are reported.

Results: At baseline 479 (51%) were employed (131/278 males; 348/667 females). Of those not working at baseline, 2% had stopped working due to RA, 62% were retired and 36% had stopped working for other reasons. At baseline, participants reported mean 39.2% overall work impairment, mean 8.5% absenteeism, and mean 36.5% presenteeism. WPAI scores improved during follow-up and were similar for males and females (Figure). Of those employed at baseline, 14% (47 females, 20 men) stopped working due to RA or retired early during the first 5 years of follow-up. Only 12 (29%) of those who stopped working due to RA returned to work (8/17 males 47%; 4/24 females 17%). Factors associated with stopping work due to RA or retiring early were for females age (OR 1.31; 1.16, 1.45), whereas previous visit pain (OR 0.9; 0.82, 0.99), oral steroid use (OR 0.38; 0.15, 0.92) and worse mental health RAND-12 mental health *t*-score increase of 5 (OR 0.87; 0.77, 0.97) reduced work stoppage. For males, stopping work was associated with previous visit pain (OR 1.31; 1.01,1.70) whereas increased household size of one other (OR 0.22; 0.05, 0.95), and mental health (OR 0.79; 0.63,0.99) reduced work loss.

Conclusion: Impairments with work and leisure activities improve over time but plateau. Sex differences between RA patients that stop vs continue work are driven by age, household size, pain and mental health. Females that stop working due to RA are less likely than men to return to work. Interventions to optimize continued engagement in work may improve productivity outcomes for RA patients and their employers.



TOUR02

Using Administrative Health Data to Construct a Frailty Index as a Measure of Susceptibility to Adverse Health Outcomes Among Individuals Living With Rheumatoid Arthritis

Alexandra Legge (Dalhousie University, Halifax); Diane Lacaille (Arthritis Research Canada, University of British Columbia, Vancouver)

Objectives: Frailty defines a state of increased vulnerability due to the degradation of homeostatic mechanisms. It can be identified using a frailty index (FI), which conceptualizes frailty as a loss of physiologic reserve arising from the gradual accumulation of health deficits across multiple domains. Our aim was to develop and evaluate an FI for individuals living with rheumatoid arthritis (RA) using administrative health data.

Methods: We conducted a population-based cohort study using administrative health data for British Columbia from 1990-2018. A previously validated case definition based on physician billing data was used to assemble an incident cohort of all RA cases with onset from 1996-2008. The baseline date for FI derivation was defined as 5 years after RA index date. We randomly sampled 50% of the cohort for FI derivation, while the remaining 50% was used for FI validation. Health deficits for the FI were selected using published criteria. First, 101 candidate variables were identified via literature review and evaluated in the derivation cohort for feasibility, prevalence, and age-relatedness. Next, 60 eligible variables were evaluated by an expert panel in a modified Delphi consensus process. Forty variables met all required criteria for inclusion. Each deficit was scored from 0 (absent) to 1 (present) and individual scores were summed to produce an FI score for each patient. We evaluated the association between baseline FI scores (measured using data for the preceding 3 years) and health outcomes during follow-up (from baseline date until the earliest occurrence of death, leaving the province, or study end date). Mortality risk was modeled using Cox regression, while negative binomial regression was used to model rates of acute care hospitalizations and emergency department (ED) visits. The predictive accuracy of the FI was compared to the Romano version of the Charlson comorbidity index (CCI).

Results: Baseline characteristics were similar in the derivation (n = 16093) and validation (n = 16092) cohorts (data not shown). In both cohorts, baseline FI scores were associated with increased mortality risk and higher rates of hospitalizations and ED visits during follow-up (Table 1). The FI was

Table 1. Comparison of the FI versus demographic characteristics and the CCI for predicting health outcomes among individuals with RA.

	Mortality risk		Acute care hospitalizations		Emergency department visits	
FI derivation cohort (n=16093 incident RA cases)	**Hazard ratio (95% CI)**	**C-statistic**	**Rate ratio (95% CI)**	**Pseudo R^2**	**Rate ratio (95% CI)**	**Pseudo R^2**
Model 1: Demographics *		0.80		0.03		0.01
Model 2: Demographics + FI		0.82		0.07		0.04
FI (per 0.025 increase)	1.16 (1.15 – 1.17)		1.20 (1.19 – 1.21)		1.20 (1.19 – 1.21)	
Model 3: Demographics + CCI		0.81		0.05		0.02
CCI (per 1.0 increase)	1.21 (1.19 – 1.23)		1.25 (1.23 – 1.27)		1.24 (1.21 – 1.26)	
Model 4: Demographics + FI + CCI		0.82		0.07		0.04
FI (per 0.025 increase)	1.13 (1.12 – 1.14)		1.18 (1.17 – 1.19)		1.18 (1.17 – 1.19)	
CCI (per 1.0 increase)	1.11 (1.09 – 1.13)		1.08 (1.06 – 1.10)		1.06 (1.04 – 1.08)	
FI validation cohort (n=16092 incident RA cases)	**Mortality risk**		**Acute care hospitalizations**		**Emergency department visits**	
	Hazard ratio (95% CI)	**C-statistic**	**Rate ratio (95% CI)**	**Pseudo R^2**	**Rate ratio (95% CI)**	**Pseudo R^2**
Model 1: Demographics *		0.80		0.03		0.005
Model 2: Demographics + FI		0.81		0.07		0.03
FI (per 0.025 increase)	1.16 (1.15 – 1.17)		1.21 (1.20 – 1.22)		1.19 (1.18 – 1.20)	
Model 3: Demographics + CCI		0.81		0.05		0.01
CCI (per 1.0 increase)	1.19 (1.17 – 1.20)		1.25 (1.23 – 1.27)		1.20 (1.18 – 1.22)	
Model 4: Demographics + FI + CCI		0.81		0.07		0.03
FI (per 0.025 increase)	1.13 (1.12 – 1.14)		1.18 (1.17 – 1.19)		1.18 (1.17 – 1.19)	
CCI (per 1.0 increase)	1.09 (1.07 – 1.11)		1.08 (1.06 – 1.10)		1.04 (1.03 – 1.05)	

* Demographic variables include age (years), sex, rural vs. urban area, and neighbourhood income quintile.
Frailty index (FI) and Romano adaptation of the Charlson comorbidity index (CCI) calculated using administrative health data for 3 years prior to baseline date.
Models evaluated using Uno's C-statistic for mortality risk and pseudo R^2 values for healthcare utilization outcomes.
Acute care hospitalizations and emergency department visits modelled as the number of events per person-year of follow-up time at risk.

similar to the Romano CCI for predicting mortality risk, but superior for predicting rates of future hospitalizations and ED visits. The FI improved outcome prediction when added to models that already included available demographic variables and the Romano CCI.

Conclusion: The FI is a promising tool for understanding the impact of frailty on the risk of adverse health outcomes among individuals living with RA.

TOUR03

Risk Factors and Clinical Outcomes Associated With Sarcopenia in Rheumatoid Arthritis: A Systematic Review and Metaanalysis

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Objectives: Sarcopenia, an important risk factor for adverse outcomes, is more prevalent among patients with rheumatoid arthritis (RA). However, risk factors and outcomes associated with sarcopenia in RA are relatively unknown. We conducted a systematic review to identify patient factors, disease factors, and clinical outcomes associated with sarcopenia in RA.

Methods: We conducted this review in accordance with 2020 PRISMA guidelines. A search was performed in PubMed, Embase, CINAHL, and Web of Science databases for articles published up to April 21, 2022. The search strategy combined the following search concepts: 1) rheumatoid arthritis and 2) sarcopenia. Title and abstract screen was independently completed by two reviewers, and full-text review was independently completed by four reviewers. Articles were included if they included RA patients, assessed for sarcopenia using a consensus working group definition, and assessed at least one clinical outcome in association with patients' sarcopenia classification. Risk of bias assessments were completed using the Newcastle-Ottawa Scales for observational studies. Studies which used the same definition for sarcopenia and shared consistency in reporting of patient or disease variables were analyzed using random effects metaanalysis.

Results: We identified 3602 articles, and after duplicates were removed, 2636 articles were included for screening. We excluded 2541 articles in the title and abstract screen and 79 articles in the full-text review, resulting in 16 articles being included for final analysis. All studies had observational study designs. The pooled prevalence of sarcopenia ranged from 24% to 56%, depending on the consensus definition used. Factors associated with sarcopenia included higher Disease Activity Score-28 (+0.39 score, 95% CI +0.02 to +0.77) and baseline methotrexate use (odds ratio 0.70, 95% CI 0.51 to 0.97). Baseline glucocorticoid use had a positive correlation with sarcopenia in multiple studies. Hand grip strength and gait speed were lower among patients with sarcopenia. Several studies found lower bone mineral density (BMD), higher prevalence of vertebral fractures, and higher incidence of falls among patients with RA and sarcopenia.

Conclusion: RA patients have a high risk of developing sarcopenia. Higher RA disease activity and baseline glucocorticoid use may be risk factors for developing sarcopenia, while methotrexate use may be protective. While more research is needed to assess clinical outcomes associated with sarcopenia in RA, there is some evidence to suggest lower BMD and increased rates of falls and fractures in sarcopenic patients. As a result, early screening of sarcopenia in RA patients is important to incorporate into clinical rheumatology practice.

TOUR04

Impact of the COVID-19 Pandemic on Patients With Rheumatoid Arthritis: Data From the Ontario Best Practices Research Initiative (OBRI)

Matthew Wong-Pack (University of Toronto, Toronto); Elliot Hepworth (Division of Rheumatology, Department of Medicine, University of Ottawa, Ottawa); Mohammad Movahedi (University Health Network, Toronto); Bindee Kuriya (Sinai Health System, University of Toronto, Toronto); Janet Pope (University of Western Ontario, London); Edward Keystone (University of Toronto, Toronto); Carter Thorne (The Arthritis Program Research Group, Newmarket); Vandana Ahluwalia (William Osler Health System, Ontario Rheumatology Association, Brampton); Angela Cesta (University Health Network, Toronto); Carol Mously (University Health Network, Toronto); Claire Bombardier (University of Toronto, Toronto); Arthur Lau (McMaster University, St. Joseph's Healthcare, Hamilton); Sibel Aydin (Ottawa Hospital Research Institute, University of Ottawa, Ottawa)

Objectives: The COVID-19 pandemic created challenges for patients with rheumatoid arthritis (RA), including accessing the health care system, transitioning to unplanned virtual care, reduction in physical activity, and management of disease activity. Our study examined the impact of the pandemic on RA patients reported outcomes (PROs), disease activity (DA) and medication profiles before and after the pandemic.

Methods: The Ontario Best Practices Research Initiative (OBRI) is an observational cohort of adult patients with active RA. We defined two study periods of one-year duration each: (1) a pre-COVID-19 pandemic phase (12 months before March 15th, 2020) and (2) a COVID-19 pandemic phase (12 months after March 15th 2020). Patients enrolled in OBRI were included if they had at least one visit with a physician or interviewer (virtually) in both study periods. Baseline characteristics, disease activity (DA), as well as other PROs (ie, Health Assessment Questionnaire Disability Index, Rheumatoid Arthritis Disease Activity Index, EuroQoL-5 Dimension Questionnaire, and medication use/changes) were included. Paired two-sample *t*-test and McNamar's test were performed for continuous and categorical variables, respectively.

Results: We identified 1508 patients (mean age = 62.7, 79.3% female). Table 1 outlines changes in disease activity measures and PROs, respectively. During the first year of the pandemic, the number of physician visits per patient increased by a mean of 0.21 visits (SD:1.51) ($P < 0.0001$). Despite

Table 1: Physician Disease Activity Measures and Patient Reported Outcomes One Year Before and During First Year of Covid-19 (15 March 2020)

Patients (N=1249)	Within one year before COVID-19	Within first year of COVID-19	Paired comparison		
			Before	After	Difference, p-value
Number of visits per patient					
N	1249	1249	1249	1249	1249
Mean ± SD	2.21 ± 1.02	2.42 ± 1.45	2.21 ± 1.02	2.42 ± 1.45	0.21 (1.51), <0.0001
Total visits per patient					
N	1249	1249	-	-	-
One visit, N (%)	299 (23.9)	560 (44.8)	-	-	-
Two visits, N (%)	569 (45.6)	-	-	-	-
Three or more visits, N (%)	381 (30.5)	689 (55.2)	-	-	-
Time (days) between visits for patients with more than one visit including virtual visits					
N	947	686	578	578	578
Mean ± SD	148.2 ± 54.3	131.1 ± 53.5	139.7 ± 52.8	128.4 ± 52.0	-11.3 (66.9), <0.0001
Swollen Joint Count (0-10)					
N	1241	810	804	804	804
Mean ± SD	1.66 ± 2.67	1.19 ± 2.67	1.66 ± 2.80	1.17 ± 2.67	-0.49 (3.04), <0.0001
Tender Joint Count (0-10)					
N	1237	763	755	755	755
Mean ± SD	2.07 ± 3.30	1.57 ± 3.22	1.97 ± 3.20	1.57 ± 3.22	-0.40 (3.73), 0.003
Clinical Disease Activity Index (0-76)					
N	1109	480	460	460	460
Mean ± SD	8.66 ± 8.54	7.63 ± 8.68	8.07 ± 8.15	7.42 ± 8.54	-0.65 (8.25), 0.09
Disease Activity Score-28 (0-9.4)					
N	991	440	401	401	401
Mean ± SD	2.97 ± 1.27	2.91 ± 1.23	2.82 ± 1.25	2.89 ± 1.23	0.07 (1.12), 0.19
Erythrocyte Sedimentation Rate					
N	916	769	703	703	703
Mean ± SD	19.3 ± 17.1	21.8 ± 19.1	19.5 ± 17.5	21.7 ± 19.1	2.20 (1.29), <0.0001
C-Reactive Protein					
N	1051	917	835	835	835
Mean ± SD	6.63 ± 11.0	6.55 ± 13.1	6.63 ± 10.8	6.34 ± 12.3	-0.29 (11.5), 0.47
bDMARDs use reported by physician					
Visits (N)	3101	3101	3101	3101	3101
Yes (%)	1119 (36.1)	1071 (34.5)	1119 (36.1)	1071 (34.5)	P=0.001
csDMARDs use reported by physician					
Visits (N)	3101	3101	3101	3101	3101
Yes (%)	2486 (80.2)	2439 (78.7)	2486 (80.2)	2439 (78.7)	P=0.003
Jak inhibitor use reported by physician					
Visits (N)	3101	3101	3101	3101	3101
Yes (%)	336 (10.8)	425 (13.7)	336 (10.8)	425 (13.7)	<0.0001
Steroid use reported by physician					
Visits (N)	3101	3101	3101	3101	3101
Yes (%)	715 (23.1)	700 (22.6)	715 (23.1)	700 (22.6)	P=0.52
HAQ-DI (0-3)					
N	709	709	706	706	706
Mean ± SD	0.91 ± 0.75	0.90 ± 0.74	0.91 ± 0.75	0.90 ± 0.74	-0.01 (0.59), 0.70
HAQ Pain (0-3)					
N	709	709	705	705	705
Mean ± SD	0.93 ± 0.76	0.89 ± 0.78	0.93 ± 0.76	0.89 ± 0.78	-0.04 (0.59), 0.05
RADAI (0-10)					
N	709	709	706	706	706
Mean ± SD	2.47 ± 1.95	2.30 ± 1.89	2.46 ± 1.95	2.29 ± 1.89	-0.17 (1.40), 0.002
Fatigue (0-10)					
N	709	709	706	706	704
Mean ± SD	3.81 ± 2.87	3.32 ± 2.89	3.80 ± 2.87	3.32 ± 2.89	-0.48 (2.42), <0.0001
Sleep (0-10)					
N	709	709	706	706	706
Mean ± SD	2.92 ± 2.95	2.77 ± 2.95	2.91 ± 2.95	2.77 ± 2.95	-0.14 (2.56), 0.14
Depression/Anxiety (0-3)					
N	709	709	706	706	706
Mean ± SD	1.16 ± 0.35	1.18 ± 0.37	1.15 ± 0.35	1.18 ± 0.37	0.02 (0.36), 0.07

the patient global and physician global assessments and composite DA scores being similar before and after the pandemic, swollen joint count (SJC) and tender joint counts (TJC) showed improvement during the pandemic (differences of -0.49 (3.04), $P < 0.0001$ and –0.40 (3.73), $P < 0.003$ respectively). Similar improvements were observed in PROs, such as RADAI (–0.17 (1.40), $P = 0.002$) and fatigue (–0.48 (2.42), $P < 0.0001$). There were also statistically significant changes in treatment during the pandemic with decreased biologic (32.6% vs 29.9%; $P = 0.002$) and conventional synthetic DMARDs use (83.3% vs 79.5%; $P < 0.0001$), while prescription of targeted synthetic DMARDs increased during the pandemic (12.1% vs 15.4%; $P < 0.0001$).

Conclusion: Disease activity and treatments for RA changed during the pandemic. Improvements in PROs may be explained by changes in patients' lifestyles, such as being able to work from home. Changes in medication profiles may relate to preferring oral agents or those with shorter half-life given the concern of immunosuppression. Future work is needed to determine if these changes persist and what implications they may have beyond the pandemic.

TOUR05

Utilization of a New Educational Platform Designed to Improve the Care of Cancer Patients Receiving Immunotherapy: An Initiative of CanRio (Canadian Research Group of Rheumatology in Immuno-oncology)

Nicole Beckett (Dalhousie University, Halifax); Carrie Ye (University of Alberta, Edmonton); Daniel Ennis (University of British Columbia, Vancouver); Marie Hudson (McGill University, Jewish General Hospital, Lady Davis Institute for Medical Research, Montreal); Shahin Jamal (Division of Rheumatology, University of British Columbia, Vancouver); Steven Katz (University of Alberta, Edmonton); Nancy Maltez (University of Ottawa, Ottawa); Janet Roberts (Division of Rheumatology, Dalhousie University, Dartmouth)

Objectives: Immunotherapy has revolutionized treatment of many advanced stage malignancies by harnessing the immune system to fight cancer. Use of these agents can lead to many off-target effects known as immune-related adverse events (irAE). The management of patients with rheumatic immune-related adverse events (Rh-irAE) as well as cancer patients with preexisting rheumatic disease (PRD) is challenging in the face of limited guiding-evidence. This is a rapidly evolving area of medicine where many rheumatologists lack experience, knowledge, and confidence. To improve the knowledge of health care providers on two specific patient populations (i) cancer patients who develop de novo Rh-irAE and (ii) patients with PRD being treated with immunotherapy by developing an educational platform that facilitates cross discipline and region collaboration and supports healthcare providers caring for these patients to ensure educational resources are available and easily accessible. Here we assess the utilization of this platform.

Methods: We developed an educational platform (www.canrio.ca) to house multiple tools to facilitate knowledge acquisition and transfer including (a) case-based learning modules (with pre and post module questionnaires), (b) interactive bimonthly case rounds, (c) up-to-date compilation of relevant research publications, (d) patient resources including drug information handouts, (e) healthcare provider resources including Rh-irAE specific handouts, (f) list of rheumatologists specializing in this field in Canada. Google Analytics is embedded within the www.canrio.ca website and was used to track website traffic since the website's inception in February of 2021.

COUNTRY	USERS
Canada	774
China	280
United States	241
India	30
Spain	10
United Kingdom	9
Ireland	8

Results: Between February 2021 and October 2022, 1431 users from 47 different countries accessed the www.canrio.ca website. The top three countries from which users accessed the site were Canada, China and the United States (Figure 1). The most accessed website pages included the homepage and login (1,739), case rounds (477), learning modules (307), doctors and clinics (243). Ninty-one people registered for case rounds; 41% rheumatologists, 43% trainees (rheumatology, oncology, internal medicine and neurology), 9% oncologists and 7% other (research coordinators, pharmacists).

Conclusion: As the use of immunotherapy increases, rheumatologists across Canada and the world will be increasingly called upon to co-manage these patients in partnership with oncologists and other healthcare providers. There is a need for further education in this rapidly evolving field of medicine and this educational program has been able to reach users not only in Canada, but all over the world. Future initiatives would be to facilitate international collaboration through case rounds, adding and updating resources, and specifically targeting an international audience. Supported by a CIORA grant.

TOUR06

Preparing for a Shared-Care Model: What Proportion of Patients With Stable Rheumatoid Arthritis Could Be Followed in Primary Care?

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Objectives: To determine the proportion of patients with stable rheumatoid arthritis (RA) currently receiving specialist rheumatology care who could be managed with primary care in a shared-care model.

Methods: A retrospective chart review was conducted using a random sample identified from two university-based clinics in Calgary, Alberta. One year of rheumatology chart notes were reviewed (01/03/2021-28/02/2022). Data were extracted for type and frequency of rheumatology visits, disease activity, and visit outcomes (eg, medication changes). RA was classified as active based on established DAS28 (≥ 2.6) and CDAI (≥ 2.9) score parameters or when visit outcomes included a medication change (added, stopped, or switched) or dose change. Patient and visit characteristics and outcomes were summarized descriptively. Patients were deemed appropriate for a shared-care model with management in primary care when RA was inactive for one year on conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) or no medication.

Results: Records from a total of 334 visits were reviewed from 165 patients (72% female) with RA, 66% (n = 81) had seropositive RA. Median age was 65 years (IQR 51-72) and median time in rheumatology care was 8 years (IQR 5-9). Patients had a median of two rheumatologist appointments (IQR 1-3) each. Visits were held in person (70%) more often than by phone (30%). Current treatment was csDMARDs (monotherapy or combination

therapy) in 43%, targeted synthetic DMARDs in 14%, biologics in 37%, and no DMARDs in 6%. Over the year, 73/155 (47%) patients had active disease at one or more, representing 119/334 (36%) of visits. Eighty-two patients had inactive disease at all visits, of which 36 were treated with csDMARDs only, and 9 were on no medication. Collectively these patients had 68 visits, with 42% (n = 19) having 2+ visits and 58% (n = 26) having 1 visit. We estimate that the overall number of rheumatologist follow-up visits could be reduced by 20% if patients who have stable inactive disease, not on medication or solely treated with csDMARDs were managed by their primary care provider.

Conclusion: Current models of care are based on predetermined scheduled follow-ups which may lead to challenges in accessing care when patients need it most. RA visits could be reduced by approximately 20% by using alternative models of care, such as redirecting stable patients to primary care, thus increasing clinic capacity for new patients or for urgent appointments. Our work demonstrates an opportunity to rethink models of rheumatology care to use limited resources more efficiently, and improve access to care. Best Abstract by a Medical Student Award. Supported by a CIORA grant.

TOUR07

Does Changing Anti-CCP Testing From Restricted Ordering to Open Ordering Change Healthcare Utilization and the Rate of Positive Testing?

Diane Ramsay (Northern Ontario School of Medicine, Thunder Bay); Trudy Taylor (Dalhousie University, Halifax)

Objectives: Rheumatoid arthritis (RA) is the most common type of inflammatory arthritis and if untreated, can cause irreversible joint destruction. The autoantibodies associated with RA are rheumatoid factor (RF) and anticyclic citrullinated protein (anti-CCP). Testing these antibodies together can increase diagnostic accuracy. Wait times to see rheumatologists are long, and inability to access testing may delay diagnosis of RA. In Nova Scotia prior to 2015, anti-CCP testing was restricted to rheumatologists. This changed in 2015, and these ordering restrictions were lifted. This study investigated the effect of these changes on anti-CCP ordering.

Methods: Nova Scotia Health (NSH) Laboratory anti-CCP data from January 2010-December 2019 was collected and analyzed for the number of anti-CCP tests pre- and postrestricted ordering, the number of positive and negative results, and the specialty of individuals ordering these tests.

Results: With removal of anti-CCP order restriction, testing increased 66% from 2010–2014 to 2015–2019. Between 2010 and 2019, the number of anti-CCP tests ordered by rheumatologists remained stable, while from 2015 when restricted ordering was removed, the number of anti-CCP tests ordered by other providers increased by 436%. The total number of positive anti-CCP tests ordered between 2010–2014 to 2015–2019 did not increase, while the number of negative anti-CCP tests increased by 191%. In terms of rates of positive tests ordered, 32% of rheumatologist ordered anti-CCP tests from 2015–2019 were positive, while 10% of the tests ordered by other providers in the same time frame were positive.

Conclusion: When ordering restrictions were removed, there was an increase in anti-CCP testing, however there was no increase in the overall rates of positive anti-CCP tests performed in Nova Scotia annually. Access to appropriate testing is important for early diagnosis of RA, and increased testing may result in quicker referrals. However, as testing itself comes with costs to the health care system as well as risks to the patient, the current study shows that more education may be necessary around appropriate anti-CCP ordering. This may help to decrease health care system overuse and unnecessary testing.

TOUR08

Less Than Half of Cryoglobulin Tests Ordered at a Tertiary Hospital Network Are Successfully Completed: An Opportunity for Improvement

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Table 1. Characteristics of cryoglobulin tests ordered at a university hospital network, 2019-2021, N=761

Characteristic	Successful n=344	Cancelled n=417
Age (years), mean (SD)	54.1 (18)	54.9 (19)
Female sex, n (%)	178 (52)	207 (49)
Year, n (%)		
2019 (n=302)	133 (39)	169 (41)
2020 (n= 211)	96 (28)	115 (28)
2021 (n=248)	115 (33)	133 (32)
Clinical setting		
Outpatient (n=387)	251 (73)	136 (32)
Emergency (n=115)	17 (5)	98 (24)
Inpatient (n=259)	76 (22)	183 (44)

Objectives: Cryoglobulin detection is essential for diagnosing cryoglobulinemic vasculitis, a condition leading to high healthcare use, organ damage, and even death. Successful cryoglobulin testing requires specific sample collection, transport, and preparation procedures, leading tests to be cancelled if appropriate conditions are not met. We evaluated factors associated with unsuccessful (ie, cancelled by the laboratory) cryoglobulin testing at our institution, and examined the effect of cryoglobulin cancellation on hospital length of stay.

Methods: We extracted data on consecutive cryoglobulin tests ordered at a university-affiliated hospital network (4 adult sites, 1 pediatric) between January 2019–November 2021. We collected patient demographics, year of test, clinical setting where the test was ordered (ambulatory vs. emergency department [ED]/inpatient), hospital site, and whether the testing was ultimately successful. Multivariable logistic regression (using generalized estimating equations) assessed factors associated with cancelled cryoglobulin testing, adjusting for age, sex, year of test, and clinical setting. We determined the most frequent reasons for cryoglobulin cancellation. Within the inpatient sample, we used linear regression to assess the association of cryoglobulin cancellation with hospital length of stay, adjusting for age, sex, hospital site, and whether patient was in intensive care unit at sampling.

Results: Of 761 cryoglobulin tests ordered, 259 (34%) were ordered for inpatients, 387 (51%) for outpatients, and 115 (15%) for ED patients (Table 1). Mean patient age at the time of test ordering was 54.5 years (standard deviation, 18.5), half (n = 384) were female, and 197 (26%) were repeated tests for the same patient. Cryoglobulin tests were cancelled 55% of the time overall, and 71% of the time among inpatients. The majority of repeat tests (68%) were ordered within 1 week of a prior cancelled test. In multivariable analyses, cryoglobulins ordered in inpatient/ED settings were more likely to be unsuccessful versus those from outpatients (adjusted odds ratio 5.6, 95% CI 4.1, 7.7). The most frequent reason for cancellation was that the specimen was not received at 37 °C/98.6 °F (46%). Among inpatients at the 3 primary adult hospital sites, having a first cryoglobulin test cancelled (versus performed successfully) was associated with a 62% (95% CI 0.94-161%) increase in hospital length of stay.

Conclusion: At our institution, cryoglobulin tests are cancelled more than half the time they are ordered, potentially leading to delayed diagnoses, repeat blood draws, and longer hospital stay. Optimizing systems of sample collection and transportation to maintain appropriate sample temperature might improve successful testing, saving resources and reducing potentially dangerous diagnostic delays.

TOUR09

False Positive Findings of Large-Vessel Vasculitis on FDG-PET in Patients Treated With Immune Checkpoint Inhibitors: A Case Series

Dylan Johnson (University of Alberta, Edmonton); Shahin Jamal (Division

of Rheumatology, University of British Columbia, Vancouver); Ryan Hung (University of Alberta, Edmonton); Carrie Ye (Division of Rheumatology, University of Alberta, Edmonton)

Objectives: FDG-PET is increasingly used in the diagnosis of large-vessel vasculitis (LVV). The ability of FDG-PET to accurately differentiate between LVV vs. physiologic uptake or atherosclerosis is dependent on multiple variables including reader expertise and FDG uptake duration. Cancer patients treated with immune checkpoint inhibitors (ICIs) frequently undergo FDG-PET for monitoring their response to therapy. Findings of vessel-wall uptake in these patients may prompt concerns for ICI-induced LVV. We aim to review the clinical course of three patients treated with ICI with probable false positive findings of LVV on FDG-PET.

Methods: Three cases of probable false positive FDG-PET imaging suggestive of LVV in the setting of ICI therapy are presented.

Results: Case One: 68-year-old female with stage IIIC melanoma on combination nivolumab and ipilimumab completed in May 2019. In July 2020, a routine FDG-PET scan demonstrated uptake throughout the thoracic aorta. There were no clinical features of LVV and CRP was normal. She was treated with high dose prednisone until a repeat scan in October 2020 had no evidence of LVV. There was no evidence of LVV over the next 2 years of follow-up. On review of the original scan, greater than typical tracer to scan time may have caused false positive findings. Case Two: 52-year-old female with stage II squamous cell carcinoma who initiated ceplimab monotherapy one week after FDG uptake to the thoracic and proximal abdominal aorta and proximal great vessels on FDG-PET in February 2022. She was not treated with immunosuppression and did not develop any clinical features of LVV. A follow-up scan in May 2022 had no features of LVV. Case Three: 60-year-old male with stage IV melanoma completed a one-year course of pembrolizumab in December 2021. An FDG-PET in March 2022 demonstrated uptake within the thoracic and abdominal aorta, and the subclavian and common carotid arteries. There were no clinical features of LVV and temporal artery ultrasound and CT-angiogram did not identify features of LVV. He was not treated with immunosuppression and a follow-up FDG-PET in August 2022 had no features of LVV. Technical issues around FDG-PET scans that can lead to these false positive findings are explored.

Conclusion: Incidental vascular wall uptake on FDG-PET in patients undergoing ICI may not represent true vasculitis. Recognition of potential vascular uptake mimicking LVV is crucial to inform the need for immunosuppression and the safety of continuing ICI therapy, highlighting the need to understand potential pitfalls of FDG-PET scan reporting.

TOUR10

Characteristics of Relapse of Individuals With ANCA-Associated Vasculitis Enrolled in the PEXIVAS Trial

Mats Junek (McMaster University, Hamilton); Peter Merkel (University of Pennsylvania, Philadelphia); Eswari Vilayur (John Hunter Hospital, Sydney); Ron Wald (University of Toronto, Toronto); Nader Khalidi (McMaster University, St Joseph's Healthcare Hamilton, Hamilton); David Jayne (Addenbrooke's Hospital, Vasculitis Clinic, Cambridge); Michael Walsh (McMaster University, Hamilton); PEXIVAS PEXIVAS Investigators (Hamilton)

Objectives: Relapses of granulomatosis with polyangiitis and microscopic polyangiitis, collectively ANCA-associated vasculitis (AAV), are common and important events. Few large, international studies describe risk factors for relapse of AAV.

Methods: Relapses occurring in participants with severe AAV enrolled in PEXIVAS, an international, 2-by-2 factorial trial of induction treatments, were studied. The primary outcome of this analysis was relapse occurring at least 90 days after randomization. Candidate predictors included baseline participant and disease characteristics. The association between relapse and the candidate predictors was assessed using time-to-event models incorporating death as a competing event using the Fine and Gray method. All models were adjusted for induction therapies.

Table 1: Baseline characteristics of participants in PEXIVAS who did not relapse compared to those that did and the sub-hazard ratios for relapse from a Fine and Gray time-to-event model with death treated as a competing risk. Interquartile range (IQR) = 25th to 75th percentile.

	No Relapse N=549	Relapse N=150	Sub Hazard Ratio (95% confidence interval)
Median age, years (IQR)	64 (56-72)	63 (53-71)	1.00 (0.99-1.01)
Female, n (%)	252 (45.4)	56 (37.3)	0.72 (0.51-1.00)
PR3-ANCA positivity, n (%)	201 (36.2)	85 (56.7)	1.67 (1.13-2.45)
Relapsing disease, n (%)	47 (8.6)	16 (10.7)	0.85 (0.49-1.48)
Baseline kidney function			
Median creatinine, µmol/L (IQR)	345 (213-516)	271 (194 to 423)	1.00 (0.999-1.0004)
On dialysis at enrollment, n (%)	123 (22.2)	17 (11.3)	0.50 (0.28-0.88)
Organ systems affected, n (%)			
Constitutional	237 (43.2)	87 (58.0)	1.34 (0.91-1.98)
Skin	45 (8.2)	31 (20.7)	1.87 (1.19-2.94)
Eye/Mucus Membrane	43 (7.8)	28 (18.7)	1.44 (0.93-2.23)
Ears/Nose/Throat	145 (26.4)	54 (36.0)	1.11 (0.76-1.63)
Cardiac	7 (1.3)	3 (2.0)	1.56 (0.38-6.44)
Respiratory*	223 (40.6)	71 (47.3)	1.51 (1.03-2.23)
Nervous	52 (9.5)	10 (6.7)	0.56 (0.29-1.10)
Lung Hemorrhage, n (%)			
No Hemorrhage	403 (72.6)	111 (74.0)	Referent
Non severe hemorrhage	102 (18.4)	28 (18.7)	0.82 (0.52-1.30)
Severe hemorrhage	50 (9.0)	11 (7.4)	0.57 (0.28-1.15)
Enrolment location, n (%)			
North America	194 (35.1)	43 (29.7)	Referent
United Kingdom	140 (25.2)	39 (26.0)	1.95 (0.59-1.55)
Non-UK Europe	136 (24.5)	36 (24.0)	0.92 (0.56-1.52)
Asia-Pacific	84 (15.2)	32 (21.3)	1.43 (0.86-2.38)

*Respiratory system involvement does not include lung hemorrhage or respiratory failure associated with lung hemorrhage.

Results: Over a median follow-up of 2.93 years, 150 (23.3%) participants experienced at least one relapse (incidence rate 7.4 per 100 patient-years). The median time to relapse was 483.5 days (interquartile range 198-920). The most common manifestations of disease at relapse were renal (58.0%), constitutional (38.7%), and ear/nose/throat (31.3%). Baseline characteristics associated with an increased risk of relapse included: PR3-positive ANCA, skin involvement, and nonhemorrhagic lung involvement (Table 1). Characteristics associated with a lower risk of relapse included female sex and receipt of dialysis.

Conclusion: Relapses remain common among patients with severe AAV. Identifying those most at risk of relapses may help plan treatments and monitoring. Best Abstract by a Rheumatology Resident Award.

TOUR11

Implementation of an eModule for Resident Education in Vasculitis: A Needs Assessment and Quality Improvement Initiative

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Objectives: Delivering comprehensive vasculitis training in Canadian rheumatology programs is challenging. Barriers include competing attention from other subjects, complexities of management, and limited exposure to rare vasculitis presentations. The Canadian Vasculitis Learning Initiative (CAVALI) provides interactive clinical cases to supplement resident education, and currently exists in paperback and PDF formats. Using a quality improvement framework, we propose to adapt the CAVALI resource into an eModule for improved effectiveness, efficiency, and learner-centeredness. We herein report the results of a stakeholder analysis and needs assessment for this initiative.

Methods: A review of the literature, discussion with stakeholders (vasculitis experts, rheumatology learners) and a root cause analysis was conducted to inform the development of two complementary needs assessment questionnaires. Questionnaires were electronically distributed using Google Forms to Canadian rheumatology program directors, and residents enrolled in Canadian rheumatology training programs. Responses were collected anonymously.

Results: Seventeen rheumatology residents and 5 rheumatology program directors responded. Themes were consistent between residents and program directors. Respondents indicated that vasculitis education was incorporated into the curriculum most frequently through formal teaching

sessions (100%), dedicated specialty clinics in vasculitis (86%), exposure during nonspecialized clinics (86%), and recommended textbooks (41%). Frequently identified barriers were competing attention from other educational topics (64%), insufficient volume of patient exposure (36%), and lack of supplemental educational resources (32%). Direct clinical exposure was most frequently rated as insufficient by residents for immune complex small vessel vasculitis (65%), polyarteritis nodosa (59%), Takayasu arteritis (53%), Behcet's disease (53%), and central nervous system vasculitis (47%). Respondents were satisfied with vasculitis education quality (86%) and quantity (68%) at their institution. A majority (86%) agreed that a clinical case-based resource is useful for learning about vasculitis. Residents preferred an eModule (47% preferred) over a physical book (12% preferred) as a vasculitis case-based resource. Similar numbers preferred an eModule over a PDF. Features that residents identified most valuable in a vasculitis eModule were clinical images (100%), integrated knowledge checks (88%), and learner ability to control the pace of completion (88%).

Conclusion: This needs assessment reinforces that vasculitis education remains challenging, particularly for a subset of infrequently encountered vasculitis. Rheumatology residents consider an eModule as a preferable vehicle for supplementary case-based vasculitis education. Valued eModule features such as knowledge checks, images, and controllable module pacing are concordant with eModule design elements recommended in the literature. Subsequent plan-do-study-act cycles will include eModule construction, with piloting in a small cohort of Canadian rheumatology residents.

TOUR12

The Effects of Initial Treatment on Relapse of ANCA-Associated Vasculitis in the PEXIVAS Trial

Mats Junek (McMaster University, Hamilton); Peter Merkel (University of Pennsylvania, Philadelphia); Eswari Vilayur (John Hunter Hospital, Sydney); Ron Wald (University of Toronto, Toronto); Nader Khalidi (McMaster University, St Joseph's Healthcare Hamilton, Hamilton); David Jayne (Addenbrooke's Hospital, Vasculitis Clinic, Cambridge); Michael Walsh (McMaster University, Hamilton); PEXIVAS PEXIVAS Investigators (Hamilton)

Objectives: Relapses of granulomatosis with polyangiitis and microscopic polyangiitis, collectively ANCA-associated vasculitis [AAV]), are important health outcomes. We describe the effects of the two randomized treatments: plasma exchange (PLEX) or no PLEX and standard- or reduced-dose oral glucocorticoid dosing regimens on relapses based on data from the international cohort of patients enrolled in the PEXIVAS trial.

Methods: Data from participants in the PEXIVAS trial were included in this posthoc analysis. PEXIVAS was a 2-by-2 factorial randomized controlled trial in patients with severe AAV evaluating the effect of 7 plasma exchanges in 14 days and two regimens of oral glucocorticoids, in addition to standard initial immunosuppression (oral cyclophosphamide, intravenous cyclophosphamide, or rituximab). The primary outcome in PEXIVAS was a composite of end-stage renal disease or death. The primary outcome for this new analysis was relapse of vasculitis occurring at least 90 days after randomization on the Birmingham Vasculitis Activity Score. Participants were followed for up to 7 years. Respiratory involvement was categorized as to whether there was diffuse alveolar hemorrhage or nonhemorrhagic pulmonary manifestations. Analyses were conducted using Cox proportional hazards models adjusted for the randomly assigned treatments and baseline characteristics including initial immunosuppression.

Results: Of the 704 participants in PEXIVAS, 150 (23.3%) experienced at least one relapse. There was no evidence of an interaction between PLEX and glucocorticoid regimen ($P = 0.41$). PLEX did not reduce the risk of relapse (hazard ratio [HR] 0.97, 95% confidence interval [CI] 0.70-1.34). The reduced glucocorticoid regimen did not alter the risk of relapse compared to the standard dose regimen (HR 0.95, 95% CI 0.68-1.32). Compared to intravenous cyclophosphamide, oral cyclophosphamide (HR 0.55, 95% CI 0.36-0.83), but not rituximab (HR 0.75, 95% CI 0.43-1.33) was associated with a reduced risk of relapse. Findings were similar when considering the competing risk of death and considering only relapses as the outcome.

Conclusion: In the PEXIVAS trial neither PLEX nor the induction oral glucocorticoid regimen substantially altered the risk of relapse in patients with severe AAV. Treatment with IV cyclophosphamide was associated with a higher risk of relapse.

TOUR13

Timeliness of Fetal Echocardiography for Congenital Heart Block Detection in Anti-Ro/La Positive Pregnancies

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Objectives: Guidelines recommend screening for congenital heart block (CHB) in anti-Ro/La-positive pregnancies with serial echocardiography starting between 16 and 18 weeks of gestational age (GA). As the most vulnerable period for CHB is from 18 to 24 weeks and early detection may improve outcomes, we evaluated timing of: 1) first fetal echocardiography for CHB screening, and 2) CHB detection in anti-Ro/La pregnancies.

Methods: We retrospectively identified all pregnancies undergoing fetal echocardiography for CHB screening and/or diagnosis between 2013 to 2021 at our institution, using an electronic database. We included those with anti-Ro/La antibodies as ascertained by chart review. We estimated

Table 1. Maternal characteristics and pregnancy complications observed in anti-Ro/La positive pregnancies undergoing fetal echocardiography for CHB screening (n=44)

Maternal age in years, mean (SD)	34.1 (3.6)
Maternal autoantibodies, n (%)	
Anti-Ro	43 (98)
Anti-La	17 (39)
Both	16 (37)
Maternal rheumatic diseases, n (%)	
SLE	30 (68)
Sjögren	7 (16)
Rheumatoid Arthritis	1 (2)
Mixed connective tissue disease	1 (2)
Maternal co-morbidities, n (%)	
Pre-gestational diabetes	1 (2)
Pre-gestational hypertension	2 (5)
Pregnancy complications, n (%)	
Congenital heart block	3 (7)
Gestational diabetes	3 (7)
Gestational hypertension/preeclampsia	4 (9)
Fetal growth restriction	7 (16)
Fetal death (IUFD)	3 (7)
Induced abortion	1 (2)
Multiple pregnancies, n (%)	3 (7)
Medications, n (%)	
Medications for rheumatological condition	41 (93)
Hydroxychloroquine during pregnancy	36 (82)

Legend: Categorical results are expressed as count **(%).** Continuous results are expressed as mean (SD). SD: standard deviation; SLE: Systemic Lupus Erythematosus; IUFD: Intrauterine Fetal Demise.

GA at the first and last fetal echocardiography based on the date of the last menstrual period.

Results: We identified 44 pregnancies, with 98% exposed to anti-Ro and 39% to anti-La (Table 1). Majority of pregnancies occurred in SLE women (68%) and most (82%) were exposed to hydroxychloroquine. Mean GA at first echocardiography was 20.4 (SD 2.8) weeks, with 32% of echocardiographies performed ≤ 18 weeks, 55% < 20 weeks, and 91% < 22 weeks. Four pregnancies had only one echocardiography throughout pregnancy: two due to late GA at first screen (30.6 and 29.1 weeks) and two due to pregnancy loss. In the 42 pregnancies with ≥ 2 echocardiographies, last screen was at a mean GA of 31.5 (SD 2.8) weeks. CHB was detected in 3/47 (6%) fetuses undergoing screening, all on their first echocardiography at 19.0, 22.4 and 29.3 weeks, respectively. Two other CHB cases were referred for echocardiography at 20.3 and 23.4 weeks of GA after incidental finding of bradycardia, with subsequent testing confirming maternal anti-Ro/La antibodies. Only one fetus (undergoing CHB screening) reversed from a 3rd-degree to a 1st-degree atrioventricular block (AVB) after receiving dexamethasone. The other four CHB fetuses remained in 3rd-degree AVB throughout pregnancy.

Conclusion: We observed that most fetal echocardiography screening for CHB in anti-Ro/La pregnancies did not occur by the recommended 16 to 18 weeks of GA. This represents an important potential care gap as all CHB were present on the first fetal echocardiography, and all were already 3rd-degree. Despite this, one fetus (out of five CHB cases) reversed from 3rd to 1st-degree AVB after dexamethasone. Timely initial screening and/or alternative diagnostic approach might be necessary to detect earlier reversible cardiac involvement in anti-Ro/La-positive pregnancies.

TOUR14

Investigating the Role of Interferon in Promoting Flares in Systemic Lupus Erythematosus

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Objectives: Systemic lupus erythematosus (SLE) is a heterogeneous autoimmune disease that ranges in severity depending on tissue and organ involvement. It is generally characterized by unpredictable periods of exacerbation, known as flares, followed by prolonged periods of disease quiescence. Interferon (IFN) is a hallmark of disease and may be involved in SLE flare mechanisms. In this study, longitudinal changes in the levels of IFN-induced protein expression were examined in the immune cells of flaring and quiescent SLE patients.

Methods: We developed a novel 41 marker mass cytometry (CyTOF) approach to study IFN-induced protein expression in various immune cells in an unbiased way. Archived peripheral blood mononuclear cells from 15 healthy controls (HCs), 26 quiescent (clinical SLEDAI = 0 for one year with no increase in immunosuppressive treatment, ≤ 10 mg prednisone) and 42 recently flaring (clinical SLEDAI ≥ 1 which required an escalation of therapy) SLE patients were examined using CyTOF. Of these, 11 quiescent and 22 flaring patients were also examined at 6 months and/or 1 year later.

Results: Many immune populations appeared to have differentiated in IFN rich environments in SLE patients compared to HCs, as evidenced by increased levels of IFN-induced proteins. There was substantial heterogeneity in the levels of IFN-induced protein expression between the different immune populations in the same patient and also between same immune populations in different patients, with significantly higher levels in flaring than quiescent patients in most immune populations. Immune populations with the largest variability in IFN protein expression levels between flaring and quiescent patients (*P* value between 0.01-0.001 for all IFN-induced proteins) included age-associated B cells (ABC), which have many features suggesting that they are immediate precursors of antibody secreting cells, as well as the T cells that support their activation such as T peripheral helper cells (Tph) and T follicular helper cells (Tfh). Conversely, levels of IFNinduced protein expression on innate immune cell subsets such as monocytes and myeloid dendritic cells did not vary between flaring and quiescent patients. Similar trends were noted in patients followed over time.

Conclusion: IFN-induced protein expression on ABCs, Tfhs and Tphs is associated with SLE flare, suggesting that IFN plays a role in promoting flares through expansion of these cell subsets.

TOUR15

Levels of Antimitochondrial Antibodies Are Associated With Disease Manifestations and Outcomes in Systemic Lupus Erythematosus

Yann Becker (Centre de recherche du CHU de Quebec, Quebec); Eric Boilard (CHU de Quebec-Université Laval Research Center, Quebec); Emmanuelle Rollet-Labelle (CHU de Quebec-Université Laval Research Center, Quebec); Christian Lood (University of Washington, Seattle); Anne-Sophie Julien (Département de mathématiques et de statistique, Quebec); Joannie Leclerc (Axe des Maladies Infectieuses et Immunitaires Centre de Recherche du CHU de Quebec - Université Laval, Quebec City); Tania Lévesque (Axe des Maladies Infectieuses et Immunitaires Centre de Recherche du CHU de Quebec - Université Laval, Quebec City); SLICC The Systemic Lupus Erythematosus International Collaborating Clinics; Paul R. Fortin (Division of Rheumatology, Department of Medicine, CHU de Quebec - Université Laval, Quebec)

Objectives: Mitochondria are intracellular organelles derived from the endosymbiosis between an α-proteobacterium and a primitive eukaryotic cell. Mitochondria display proinflammatory and antigenic properties when released into the extracellular milieu. We have reported that the presence of antimitochondrial antibodies (AMAs) were associated with various clinical manifestations [eg, lupus nephritis, arterial vascular events (AVEs), carotid plaque] in patients with systemic lupus erythematosus (SLE). In the present study, we aim to detect the presence and levels of various AMAs in samples from patients from the Systemic Lupus Erythematosus Collaborative Clinics (SLICC) inception cohort.

Methods: The SLICC protocol collected clinically relevant variables (sociodemographic variables, disease characteristics and medications) and disease-specific outcomes [ie, SLICC damage index (SDI), death, AVE, lupus nephritis and SLICC definition A for neuropsychiatric events (NPSLE)] and bio samples yearly for up to 20 years. Levels of autoantibodies against whole organelles (AwMA), mitochondrial DNA (mtDNA) or RNA (mtRNA) were measured by in-house direct ELISAs whereas SLE autoantibodies were detected by clinical laboratories. Healthy individuals, defined as having no known illnesses and infectious symptoms at the time of the blood draw, were recruited. Cox regressions with marginal effects for center were adjusted for covariables [eg, sex, age, disease duration, body mass index (BMI), risk factors and medication]. Interaction of AMAs with sex were tested for each outcome.

	AwMA	AmtDNA	AmtRNA
Deaths	**3.19 (1.40 - 7.26)**	2.43 (0.82 - 7.18)	1.242 (0.61 - 2.54)
AVEs	0.65 (0.29 - 1.44)	0.96 (0.43 - 2.15)	**Females: 1.56 (1.11 - 2.19)** **Males: 0.32 (0.11 - 0.99)**
Lupus nephritis	0.83 (0.17 - 4.06)	**Females: 4.00 (2.51 -6.36)** Males: 1.38 (0.51 - 3.76)	**1.68 (1.34 - 2.11)**
Damages	0.99 (0.50 - 1.96)	1.11 (0.81 - 1.52)	1.01 (0.75 - 1.37)
NP-SLE	1.02 (0.46 - 2.24)	0.97 (0.62 - 1.50)	1.03 (0.67 - 1.58)

Results: Sera from 1114 SLICC patients were included from their inclusion up to 7 years of follow-up and a total of 3577 samples. Of these, 88.6% were female. Mean age (± SD) was 35.4 ± 13.4-year-old, with a SLE disease activity index-2000 (SLEDAI-2K) score of 5.3 ± 5.3. AMA levels increased for both AwMA and AmtRNA but were stable for AmtDNA. An elevation of the AwMA were associated with higher risk of death in SLE patients [Hazard ratio (95% confidence interval) = 3.19 (1.40-7.26)]. Women with increased AmtDNA were at higher risks of lupus nephritis [4.00 (2.51-6.36)]. Risk of this outcome was also higher in patients with elevated AmtRNAs [1.68 (1.34-2.11)], with no influence of sex. Surprisingly, AmtRNA were associated with increased risks of AVEs in women [1.56 (1.11-2.19)] but decreased risk in males [0.32(0.11-0.99)]. No associations were observed between AMA levels and either damages, or NPSLE (Table 1).
Conclusion: These results show that AMA constitute candidates for prediction of severe outcomes in SLE patients and that sex appears to interact with the effect of AMAs on disease manifestations.

TOUR16

Liver Transplantation in a Patient With Systemic Lupus Erythematosus and Liver Failure

Derin Karacabeyli (University of British Columbia, Vancouver); Henrique De Sa Ellwanger (University of British Columbia, Vancouver); Landon Tam (University of British Columbia, Vancouver); David Schaeffer (Pathology, University of British Columbia, Vancouver); Saumya Jayakumar (University of British Columbia, Vancouver); Antonio Avina-Zubieta (University of British Columbia Faculty of Medicine; Arthritis Research Canada, Vancouver)
Background: Chronic liver disease occurs in 4-5% of patients with systemic lupus erythematosus (SLE) and is usually due to secondary causes (eg, drugs, alcohol, or infection). While SLE is associated with other autoimmune diseases affecting the liver (eg, autoimmune hepatitis, primary biliary cholangitis, and antiphospholipid antibody syndrome), lupus itself rarely causes symptomatic liver disease. Lupus hepatitis is often subclinical, presenting with elevated transaminases that typically correlate with disease activity.
Case: We present a case of liver failure leading to transplantation in a 64-year-old patient with longstanding previously well-controlled SLE on hydroxychloroquine monotherapy. Her initial manifestations included malar rash, oral ulcers, fever, Raynaud's, and inflammatory arthritis. She had not had a flare in 15 years. She was brought to hospital with a one-week history of jaundice and confusion. Initial labs revealed INR > 9, AST 757, ALT 509 (normal 2 months prior), normal GGT and ALP, albumin 16, bilirubin 224, and platelets 77; she was diagnosed with acute liver failure. Her husband described 1-2 months of preceding fatigue and progressive bilateral hand, foot, and ankle pain. Due to worsening hepatic encephalopathy, she was intubated and transferred to the intensive care unit (ICU). On examination, she had symmetric synovitis in the MCPs and PIPs bilaterally. Extensive workup ruled out infectious, toxic, drug-induced, thrombotic/ischemic, malignant, and hereditary causes of liver failure. Autoimmune testing revealed negative antismooth muscle and liver/kidney microsome type 1 antibodies, but significant increases in dsDNA and decreases in C3 and C4 compared to outpatient values two months prior. Methylprednisolone pulse therapy was initiated; a liver biopsy was completed showing ≥ 99% necrosis with severe lymphoplasmacytic inflammation and central vein endothelitis. The patient was then induced with basiliximab and urgent liver transplantation was performed. Explanted liver pathology revealed severe hepatitis with necrosis and background cirrhosis. With posttransplant immunosuppression, the patient's complement levels normalized and dsDNA returned to pre-admission levels. She initially showed signs of recovery, but died of septic shock after two months in ICU. As no alternate cause was identified and she had preceding symptoms and biomarkers supportive of an SLE flare, her subclinical cirrhosis and subsequent subacute deterioration were attributed to SLE. This is the sixth published case of liver transplantation in SLE and the second where no alternate cause of liver failure was found. It is the first with evidence of preceding clinical and biochemical lupus disease activity.
Conclusion: Cirrhosis and liver failure secondary to SLE are exceeding rare but described phenomena.

TOUR17

Clinical Presentation and Outcomes of Children Treated for Lyme Arthritis: Experience From a Large Pediatric Cohort in Nova Scotia, Canada

Jenna Nauss (Dalhousie University, Halifax); Jeanette Comeau (IWK Health, Halifax); Luke Gauthier (IWK Health, Halifax); Chelsea DeCoste (IWK Health Centre, Halifax); Suzanne Ramsey (IWK Health, Halifax); Adam Huber (IWK Health Centre, Halifax); Bianca Lang (IWK Health Centre, Halifax); Elizabeth Stringer (IWK Health Centre, Halifax)
Objectives: Lyme disease (LD) has emerged as a major Canadian public health threat over the past decade. Lyme arthritis (LA), a late presentation of LD, disproportionately affects children. Our objective was to describe the presentation and clinical course of children with LA seen in a tertiary care pediatric rheumatology clinic.
Methods: Patients ≤ 18 years of age with LA, with at least one follow-up visit after initiation of antibiotics were identified from the IWK Pediatric Rheumatology Clinic Database in Halifax, Nova Scotia (Jan 2006-June 2022). LA was defined as clinical evidence of arthritis with a history of residence in, or visit to, a LD endemic area; and a positive two-tiered serologic test. Demographic, clinical presentation, treatment, and outcome data were collected from patient charts. Postinfectious LA (PILA) was defined as persistent arthritis 3 months after initiation of antibiotics.
Results: 184 patients were identified; 3 cases (2006-2010), 25 cases (2011-2015), 88 cases (2016-2020), and 68 cases in the last year and a half (2021-June 2022). Median age was 9 years (range 2-16); 122 (66%) were male. 46 (25%) children recalled a tick bite and 12 (7%) reported a history of erythema migrans. Arthritis was monoarticular in 113 (61%), oligoarticular in 63 (34%), and polyarticular in 8 (4%); the knee was involved in 172 (93%) patients. Additional clinical features and investigations are shown in Table 1. Median follow-up postinitiation of antibiotics was 3.5 months (range 1-63). 153 (67%) received one course of antibiotics, 45 (24%) received two, and 16 (9%) received 3. Intravenous ceftriaxone was used in 31 treatment courses (7 for initial antibiotic course, 13 as 2nd course, and 11 as 3rd course; some patients had > 1 course of ceftriaxone). Twenty-six (14%) children developed PILA; all but 5 received at least one course of ceftriaxone. Of the patients with PILA, 13 (50%) were treated with a steroid injection, 12 (46%) NSAIDs, 2 (8%) DMARDs and 1/26 (4%) a biologic

Table 1 Additional Clinical Features and Laboratory Results of Patients with LA

Lyme arthritis presentation (n=184)	n (%)
Symptom onset	
Jan-Mar	49 (26)
Apr-Jun	28 (15)
Jul-Sep	52 (28)
Oct-Dec	55 (33)
Referral source	
General Practitioner	60 (33)
Orthopedic Surgeon	58 (32)
Emergency Department	27 (15)
Infectious Disease Specialist	20 (11)
Pediatrician	12 (7)
Other	7 (4)
Presence of fever (>38 degrees Celsius) with arthritis	20 (11)
Episodic arthritis (vs continuous)	89 (48)
Arthrocentesis performed	65 (35)
Admission to hospital for work-up	34 (18)
Incision and drainage of joint by orthopedics	8 (4)
Duration of hospital admission (days) *median (range)	*4 (1-8)
Laboratory	**Median (range)**
Erythrocyte sedimentation rate (ULN 9mm/hr)	27 (1-100)
C-Reactive Protein (ULN 5 mg/L)	14.1 (0.1-134)
White blood cell count (x10^9/L)	8.22 (2.22-18.42)
Synovial fluid WBC (x10^6/L)	55 846 (6 908-119 264)
% Neutrophils of WBC in synovial fluid	90.5 (61-98)

(> 1 treatment was received in some patients). Of those with PILA, 19 had full resolution; 7 had ongoing evidence of active arthritis at last follow-up (4% of entire cohort).

Conclusion: There has been a significant increase in the number of children with LA referred to pediatric rheumatology in our center. The outcome for most children is excellent although almost a third will require more than one course of antibiotic due to incomplete response and just over 10% will require ongoing follow-up for PILA.

TOUR18

Validation of a Rapid Lyme Disease Assay in Children With Lyme Arthritis and Non-Lyme Articular Presentations in a Lyme-Endemic Region

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Objectives: Lyme disease (LD), an emerging public health threat in Canada, is endemic in all regions of Nova Scotia. Lyme arthritis (LA), which disproportionally affects children, is a late manifestation of LD and presents as a mono- or oligo-articular arthritis. The Standard Two-Tiered Test (STTT) is used to diagnose late LD, however, the turn-around time is days to weeks. In the acute setting, lack of a timely diagnostic test can lead to unnecessary testing (synovial fluid aspiration), interventions (joint incision and drainage) and hospital admission, particularly when there is a concern for a septic joint. The objective of this study was to retrospectively evaluate the diagnostic performance of the Sofia Fluorescent Immunoassay (SFIA) in children with articular symptoms known to be LD positive or negative by Western Blot (WB).

Methods: The SFIA detects and differentiates serum IgM and IgG antibodies to Borrelia burgdorferi providing results within 1 hour. Residual serum samples of LD negative [defined as enzyme immune assay (EIA) negative or EIA positive/IgG negative on WB] and LD positive (defined as EIA positive and IgG positive on WB) patients were identified at our institution. Samples from patients 1–16 years of age presenting with articular symptoms (eg, pain, swelling, stiffness) were included in this study. Health records were reviewed for demographic, clinical, and laboratory data. SFIA IgG antibody positivity was the focus of this study as LA is a late manifestation of LD, whereas IgM is a marker of early LD. Sensitivity and specificity for the SFIA were calculated compared to the reference standard of the STTT.

Results: The study included 106 samples (51 LA, 55 non-LA). Non-LA diagnoses included JIA (21), mechanical (14), arthralgia (8), reactive (4), septic (1), and other (7). The SFIA IgG was positive in all LA samples and negative in 53 non-LA samples (specificity of 100% and sensitivity of 96.4%). The 2 false positive results were from children with a diagnosis of JIA (ERA and RF neg poly). SFIA IgM was positive in 9 (16%) non-LA samples; WB testing confirmed these samples were IgM negative.

Conclusion: Our results suggest that the SFIA IgG holds promise as a rapid stand-alone test to help diagnose or exclude LA in children presenting with articular symptoms in a Lyme-endemic region. This would allow for prompt initiation of antibiotics and avoidance of additional unnecessary testing and surgical intervention. In contrast, the SFIA IgM appears prone to false positives and should be confirmed by WB testing.

TOUR19

Lived Educational Experience of Young Adults With Childhood and Adult-Onset Systemic Lupus Erythematosus: A Multicenter Canadian Qualitative Study

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Objectives: Education and employment established in young adulthood predict future lifetime socioeconomic achievements. Young adults with Systemic Lupus Erythematosus (SLE) have physical, cognitive and mental health issues and other comorbidities that may impact employment. We aimed to understand the lived experiences of young adults with SLE (YASLE), as students, and to assess their perceived barriers from SLE.

Methods: YASLE were recruited from two Lupus clinics in Toronto and Winnipeg. Semistructured qualitative interviews were conducted individually via secure video conferencing. As this study was conducted during the coronavirus pandemic, participants were also asked about the pandemic impacts on their education experiences. All interviews were transcribed verbatim, double-coded and analyzed using a reflexive thematic approach.

Results: Twelve participants (2 males), 9 of childhood- and 3 adult-onset SLE (cSLE, aSLE) were interviewed. Nine participants (82%) were < 25 years old. Five also worked while studying. Five were Asians, 5 were White, 2 of other ethnicities. Half have severe disease (central nervous system or renal involvement). Median years of disease was 4.0 (25th-75th percentile, 1.8-5.3). The impacts of SLE on their education experience emerged in 5 themes: 1) Challenges imposed by SLE: Difficulties adjusting to the diagnosis, physical and cognitive symptoms of SLE. While most participants disclosed their diagnosis to their schools, some expressed hesitation. 2) Changes in aspirations: Education/career goals were modified by reducing course load or shifting to more sedentary or less cognitively demanding careers. 3) Coping and acceptance: More adaptive than maladaptive coping strategies were used to manage their SLE, including self-acceptance, pacing, planning and avoidance. All strived to do well in their studies despite SLE and were hopeful for their futures. 4) Facilitating factors for education success: Family and friends' social support, individualized accommodations from school and parental financial support were identified. 5) Pandemic impacts: Virtual learning and flexible schedules enabled participants to adapt their schedules according to their physical conditions (e.g. pain, fatigue). However, fewer opportunities to interact in-person were viewed as challenges. Participants want hybrid options to continue even after the pandemic.

Conclusion: SLE affected students' performance through physical symptoms, fatigue and cognitive dysfunction. Ongoing social and school supports help to support them. Maintaining the remote learning options may increase accessibility for them. These results identified opportunities for developing future supportive interventions for YASLE patients in their schooling which then better prepare them for future employment.

TOUR20

Loss to Follow-Up After Transfer to Adult Care in Patients With JIA or SLE

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Figure 1.1: Transition Success vs. Loss to Follow Up (LFU)

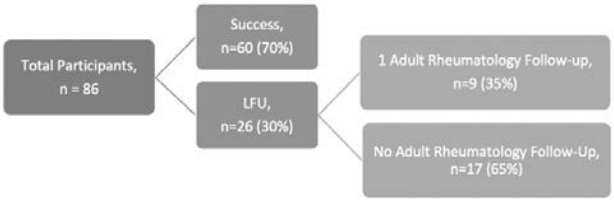

Table 1.1: Patient demographics and characteristics.

Patient Characteristics	All patients, n=86	Not LFU, n=60	LFU, n=26
Mean age at diagnosis (SD), years	12.3 (4.6)	12.2 (4.6)	12.3 (4.6)
Gender, n female (%)	58 (67%)	45 (75%)	13 (50%)
Diagnosis of JIA, n (%)	74 (86%)	49 (82%)	25 (96%)
Mean (SD) cJADAS, n=71	2.3 (3.8)	2.6 (3.9), n=45	1.8 (3.6), n=25
Mean (SD) CHAQ, n=37	0.5 (1.2)	0.5 (0.9), n=22	0.5 (1.6), n=15
Mean (SD) QoL, n=37	84.3 (16.3)	83.6 (16.7), n=22	85.4 (16.1), n=15
Mean (SD) Pain, n=83	1.1 (1.7)	1.2 (1.6), n=56	1.1 (2.1), n=26
Mean (SD) Transition-Q score, n=79	65 (12)	66 (13), n=54	64 (10), n=25

Stephanie Garner (University of Calgary, Calgary); Liane Heale (McMaster University and McMaster Children's Hospital, Hamilton); Mark Matsos (McMaster University, Hamilton); Michelle Batthish (McMaster University, Hamilton)

Objectives: Adolescents with rheumatic disease must continue to receive care as they age, requiring transfer from pediatric to adult rheumatology around 18 years old. For patients with juvenile idiopathic arthritis (JIA) and systemic lupus erythematosus (SLE), the potential for their disease to remain or become active after transfer to adult rheumatology necessitates that efforts be made to minimize risk of losing these patients to follow-up. Since the reporting of loss to follow-up (LFU) rates between 1992-2005 from one Canadian center,[1] there is a dearth of LFU data despite significant advances in research and care to improve transition to adult care for patients. We aimed to (i) determine rates of LFU of patients seen in a multidisciplinary transition program, and (ii) describe characteristics of patients who were LFU.

Methods: We performed a retrospective review of patients diagnosed with JIA or SLE who were followed in the McMaster multidisciplinary rheumatology transition clinic and enrolled in an observational transition study. This clinic is staffed by pediatric rheumatologists and the adult rheumatologist to whom the patient will likely be transferred. Patients were considered LFU if they did not attend their first or second appointment with their adult rheumatologist. Patient demographics, disease characteristics (cJADAS, CHAQ, QoL, and pain) and transition readiness (Transition-Q, max score 100[2]) scores were collected. Descriptive statistics were used to determine means and standard deviations for continuous variables, and frequencies and proportions for categorical variables.

Results: Eighty-six patients were included. Of these, 70% successfully transferred to adult care (Figure 1). Of those who were LFU, 65% never saw the adult rheumatologist they were referred to. Three-quarters of those who transferred successfully were female. Mean disease activity, quality of life, pain and Transition-Q scores (Table 1) appeared similar between those who were and were not LFU.

Conclusion: Integrating coordinated transfer of care processes from a multidisciplinary pediatric transition clinic resulted in lower LFU rates than those reported in a previous publication (50%). While disease activity, quality of life, pain and Transition-Q scores did not appear worse in those LFU, our results did not include data from all patients. Despite the predominance of females in the study, females comprised the majority of successful transfers leading us to question whether males may be at greater risk of LFU. These are areas that warrant further investigation. Multidisciplinary care programs may improve LFU potentially leading to improved long-term outcomes of patients with JIA or SLE. References: [1.] Hazel E. Pediatr Rheumatol 2010;8:2. [2.] Klassen A. Child Care Health Dev 2014;41(4):547-58.

TOUR21

Overexpression of Mucin 16 and Mesothelin Promotes Fibrosis in Rapidly Progressive Systemic Sclerosis Patients

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Objectives: Systemic sclerosis (SSc) is a deadly, incurable disease characterized by fibrosis, immune dysregulation and vasculopathy. Skin fibrosis is the hallmark of SSc, and the extent of skin involvement is predictive of the extent of internal organ involvement. Of all patients with rheumatic diseases, patients with early diffuse SSc (edSSc) develop the highest mortality rate, which primarily stems from fibrotic complications associated with disease. The primary mediators of fibrosis are human dermal fibroblasts (HDF), which develop a myofibroblast phenotype. Previous study showed heavily glycosylated protein mucin16 (MUC16, also known as cancer antigen-CA-125) interact with its binding partner mesothelin (MSLN) to promote fibrosis, however its role in the pathogenesis of SSc is unknown. We have recently shown that MUC16 gene is frequently mutated in SSc skin. MUC16 mutations are predicted to generate a truncated form known to be secreted and/or act as an oncogene. We hypothesized that mutated MUC16-MSLN axis in HDF may promote fibrosis in patients with edSSc.

Methods: We enrolled 11 consecutive patients with edSSc (< 2 years from onset of non-Raynaud's symptoms) and consecutive age and gender-matched healthy controls (HCs). We generated HDFs from both groups using 4 mm skin biopsies obtained 5 cm from ulnar styloid. Serum MUC16 levels were measured via ELISA. MUC16 levels were determined in skin biopsy sections and low passage (P2-P5) in vitro cultured HDFs from each group by immunofluorescence microscope and dot blot using antibodies targeting the oncogenic C-terminal transmembrane domain, or other parts of protein. Expression of MSLN was analyzed by qRT-PCR. Furthermore, we treated HC HDFs with recombinant soluble MUC16 and measured profibrotic signals, eg, collagen 1 A1 (col1A1) via qRT-PCR.

Results: We found that patients with edSSc had a substantial increase in MUC16 expression in skin myofibroblasts and primary cultured HDF compared to HC (particularly its C-terminal oncogenic form) with nearly 10-fold increased MSLN mRNA expression. MUC16 serum levels were also increased compared to HC ($P < 0.05$). Finally, treatment of HDFs with soluble MUC16 was sufficient to promote profibrotic signals.

Conclusion: Mutations in MUC16 may be a promoter of fibroblast dysfunction and fibrosis in SSc through a novel MUC16-MSLN axis. Further studies assessing the impact of MUC16 mutations in promoting disease progression, fibroblast dysfunction and immune dysregulation may provide added insights for its importance in SSc. It may also provide added rationale for targeting it therapeutically. Funding: our work was generously supported by the Arthritis Society, Scleroderma Canada, Dutch Kidney Foundation.

TOUR22

Impaired DNA Repair Response Activates a Novel FOXO1-Dependent Metabolic Remodeling in Patients With Progressive Systemic Sclerosis

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Objectives: Systemic sclerosis (SSc) is a deadly disease characterized by immune dysregulation, vasculopathy, and fibrosis. There is currently no known cure, and disease associated mortality rivals most aggressive cancers. Human dermal fibroblasts (HDFs), the primary cells promoting fibrosis, develop a myofibroblast phenotype associated with increased apoptosis resistance. We recently showed that SSc patients' HDFs have increased genomic instability that are associated with double-stranded DNA breaks (DSBs). Dysregulated DNA damage responses have been shown to be

associated with transcription factor, forkhead box protein O (FOXO) activation in cancers. As such, we hypothesized that HDFs with increased DSBs from patients with SSc have increased apoptosis resistance promoted by FOXO1.

Methods: Primary human dermal fibroblasts (HDF) were generated from healthy volunteers (HC), prefibrotic patients with early limited SSc (elSSc), and patients with early diffuse severe scleroderma (edSSc) using 4 mm skin biopsies obtained 5 cm from ulnar styloid. All in vitro cultured HDFs were low passage (< P5). γ-H2AX (a DSB marker) was determined via immunoblots (IB). HC HDFs were treated with DNA damage-inducing agent etoposide, then nuclear FOXO1 and the myofibroblast marker alpha-SMA were quantified using IB and qRT-PCR. Nuclear FOXO1 activation was detected by immunofluorescence microscope. Profibrotic signals (eg, fibronectin) were determined in edSSc HDFs in presence or absence of FOXO1 inhibitor.

Results: We found that patients with aggressive edSSc have the highest levels of γ-H2AX compared to HC and elSSc patients. edSSc HDFs also had a substantial nuclear accumulation of FOXO1. This was associated with increased mRNA expression of known FOXO1 and its metabolic target, pyruvate dehydrogenase kinase 4. FOXO1 inhibition of edSSc HDFs resulted in decreased levels of fibronectin. Intriguingly, etoposide treatment of HDFs from HC also resulted in FOXO1 activation and was associated with myofibroblast differentiation.

Conclusion: DSBs are more commonly present in fibroblasts from patients with rapidly progressive severe SSc. DSBs may promote myofibroblast differentiation, and fibrosis through a FOXO1-dependent mechanism. FOXO1 activation may also promote resistance to apoptosis through metabolic remodeling. Our findings may lead to developing a deeper understanding for the mechanisms promoting progression in SSc. They may also have far-reaching implications such as novel prognostic and therapeutic strategies in SSc. Funding: Dutch kidney foundation, Arthritis Society, Scleroderma Canada and GlycoNET. LK is supported by WCHRI PhD graduate award and MO is supported by Arthritis Society STAR award.

TOUR23

Machine Learning Analysis of Sporadic Inclusion Body Myositis Biomarkers

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Objectives: Sporadic inclusion body myositis (sIBM), a subset of autoimmune inflammatory myopathies (AIM), is often difficult to diagnose. The objective of this study was to identify sIBM biomarkers that would allow for an earlier and more accurate diagnosis and prediction of disease phenotypes using several machine learning (ML) approaches.

Methods: Clinical and demographic information were obtained on 230 sIBM patients and AIM disease controls. Baseline sera from these patients were tested for conventional and novel autoantibodies: myositis (including anti-NT5c1A/Mup44 and mitofusin (MFN)-1 and 2) using an addressable laser bead immunoassay, a multiplexed autoimmune liver disease array, and antinuclear antibodies (ANA) on HEp-2 substrates by an indirect immunofluorescence assay (IFA). Seven classification algorithms including an artificial neural network and a decision tree-based algorithms were trained to differentiate sIBM from AIM based on the autoantibodies. Agglomerative hierarchical clustering based on clinical features (creatine kinase level, dysphagia, knee extension weakness, quadriceps atrophy, grip strength, and disease severity (graded by expert)) was performed to identify clinical sub-phenotypes of sIBM. InterpretML explainable boosting machine, a generalized additive model that predicts feature contributions to patterns in the data, was performed to examine the autoantibodies associated with each sIBM cluster.

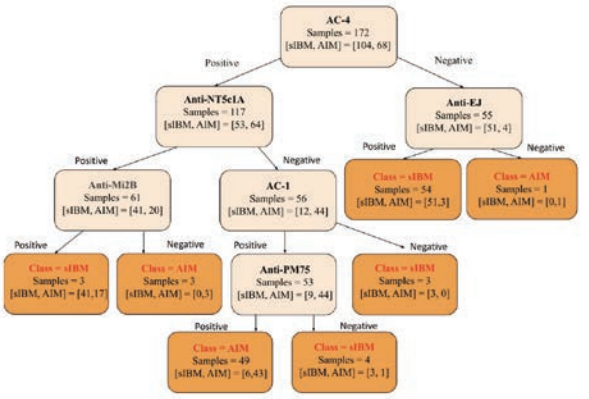

Figure 1. sIBM vs. AIM decision tree model based on autoantibody profile. sIBM, sporadic inclusion body myositis; AIM, autoimmune idiopathic inflammatory myopathies.

Results: The 230 individuals studied included 93 sIBM patients (38.7% female, mean age 68.3 ± 9.1 years) and 137 AIM comparators (68.1% female, mean age 57.6 ± 14.4 years). The neural network classification model classified sIBM with 92% accuracy, while the accuracy rate of the decision tree model was 79% (Figure 1). Compared to AIM, sIBM patients were characterized by higher frequency of anti-Mup44, anti-Mi2β, and the absence of ANA (particularly the nuclear fine speckled [AC-4] and nuclear homogenous [AC-1] IFA patterns), anti-RuvBL1, and anti-Ro52/TRIM21. Hierarchical clustering identified four sIBM clinical phenotypes (cluster 1: males with severe disease, cluster 2: males with mild disease, cluster 3: females with severe disease, cluster 4: females with mild disease). Autoantibodies to Mup44 and RuvBLl were associated with sIBM clusters having higher disease severity (clusters 1 and 3), while a positive ANA, anti-Ro52/TRIM21, and anti-MFN1 antibodies were associated with milder disease (clusters 2 and 4).

Conclusion: In this comprehensive ML analysis of established and autoantibodies, sIBM could be differentiated from other types of AIM with an accuracy of up to 92%. Four sIBM clusters that differed in sex, disease severity and autoantibody profiles were identified. Future studies to study other novel biomarkers and validate our findings in larger cohorts are needed.

TOUR24

Use and Persistence of Trimethoprim Sulfamethoxazole Prophylaxis in Patients With Granulomatosis With Polyangiitis Treated With Rituximab

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Objectives: Trimethoprim sulfamethoxazole (TMP-SMX) prophylaxis against of pneumocystis jiroveci pneumonia is recommended during induction of ANCA-associated vasculitis. We described the frequency and persistence of TMP-SMX prophylaxis in patients with granulomatosis with polyangiitis (GPA) treated with rituximab (RTX), and determine factors associated with TMP-SMX use.

Table 1. Cohort characteristics overall and according to baseline trimethoprim sulfamethoxazole (TMP-SMX) use (N=1877)

Characteristic at time of first rituximab treatment		Overall cohort N=1877	TMP-SMX N=426	No TMP-SMX N=1451
Demographics	Age, mean (SD)	50.9 (16)	48.4 (15)	51.6 (16)
	Female sex (%)	1008 (54)	188 (44)	820 (57)
Insurance type, n (%)	Commercial	1393 (74)	345 (81)	1048 (72)
	Medicare	253 (14)	37 (9)	216 (15)
	Medicaid	231 (12)	44 (10)	187 (13)
Year of rituximab, n (%)	2011-2015	898 (48)	185 (43)	713 (49)
	2016-2020	979 (52)	241 (57)	738 (51)
Healthcare use in prior 6 months	≥1 Emergency visit	808 (43)	221 (52)	587 (41)
	≥20 physician visits	577 (31)	164 (39)	413 (28)
	≥1 hospital admission, n (%)	774 (41)	236 (55)	538 (37)
	≥ Intensive care unit admission, n (%)	317 (17)	102 (24)	215 (15)
Disease features and/or co-morbidities, n (%)	Sinusitis	491 (26)	116 (27)	371 (26)
	Obstructive lung disease	393 (21)	92 (23)	297 (21)
	Interstitial lung disease	90 (5)	19 (4)	71 (5)
	Glomerulonephritis	208 (11)	46 (11)	162 (11)
	Chronic kidney disease	435 (23)	91 (21)	344 (24)
	Dialysis	172 (9)	40 (9)	132 (9)
	Diabetes	273 (15)	56 (13)	217 (15)
	Serious infection[1]	159 (9)	48 (11)	111 (8)
Medication use, n (%)	Glucocorticoids[2]	850 (45)	307 (72)	543 (37)
	Mean prednisone equivalent dose ≥20 mg/day[2]	425 (23)	179 (42)	246 (17)
	Cyclophosphamide[3]	61 (3)	14 (3)	47 (3)
	Azathioprine[3]	92 (5)	20 (5)	72 (5)
	Methotrexate[3]	202 (11)	61 (14)	141 (10)
	Atovaquone[3]	43 (2)	4 (1)	39 (3)
	Dapsone[3]	38 (2)	3 (1)	35 (2)

[1]inpatient visit primary diagnosis code for a bacterial or unspecified infection in prior 6 months
[2] dispensed in the prior month
[3]dispensed in the prior 6 months

Methods: We identified adults with GPA from the MarketScan United States Commercial and Medicaid health care databases who had a claim for RTX following the first GPA diagnostic code between 2011-2020. We defined baseline TMP-SMX prophylaxis as a minimum 28-day prescription of TMP-SMX, overlapping with the first RTX treatment or dispensed within the following month. Baseline covariates included age, sex, calendar year, insurance type, recent glucocorticoid and immunosuppressant use, health care use, and associated conditions. Univariable and multivariable logistic regressions identified factors associated with TMP-SMX use. We estimated TMP-SMX persistence, allowing a prescription refill gap of 14 days.
Results: We studied 1877 RTX-treated GPA patients. At the time of RTX initiation, mean age was 50.9 (SD 16) years and 54% were female (Table 1). Baseline TMP-SMX was dispensed to 426 (23%) subjects. Median TMP-SMX persistence was 103 (IQR 44, 177) days. In multivariable analyses, female sex (OR 0.64; 95% 0.51, 0.81) and atovaquone/dapsone prescription in the 6 months prior to rituximab (OR 0.23; 95% 0.09, 0.48) were negatively associated with baseline TMP-SMX use, while prednisone > 20 mg/day in the month prior to RTX (OR 2.96; 95% CI 2.29, 3.82), and hospitalization (OR 1.89; 95% CI 1.45, 2.46) and immunosuppressant use (OR 1.54; 95% CI 1.13, 2.1) in the prior 6 months were positively associated with baseline TMP-SMX. Sensitivity analyses using new-user design (n = 919) and defining TMP-SMX use as any 28-day prescription in the 6 months following RTX yielded similar estimates.
Conclusion: In our analyses, TMP-SMX was dispensed to less than a quarter of GPA patients in the month following RTX, and among TMP-SMX users, median persistence was less than 6 months. Recent prednisone was associated with TMP-SMX use. Further work is needed to confirm if TMP-SMX reduces pneumocystis risk, and/or all-cause serious infections, in patients with GPA treated with RTX.

TOUR25

Lived Experiences That Influenced Self-Perception and Identity Among Individuals With Rheumatoid Arthritis During the COVID-19 Pandemic

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Objectives: Experiences of Rheumatoid Arthritis (RA) self-care often involve dealing with emotional and psychological challenges arising from disruptions to a person's self-perception or their identity. One aim of our qualitative study was to explore lived experiences, from individuals with RA, on self-perception and identity during an unprecedented COVID-19 pandemic.
Methods: The study was jointly designed and conducted with patient partners with RA. Between December 2020 and December 2021, we conducted one-to-one semistructured interviews (30-70 mins) with adults with RA. Participants were purposively sampled from a randomized controlled trial (RCT) testing a web-based self-care intervention. To be eligible, participants had: 1) a physician confirmed diagnosis of RA; 2) no joint surgery in the past six months; 3) no history of acute injury to any joints in the past six months; 4) an email address and daily access to a computer or mobile device. We aimed for maximum variation in age, sex, and education, within the limits of our RCT sample. A reflexive thematic analysis approach was used.
Results: Thirty-nine participants (aged 26-86; 36 females) were interviewed. Twenty-four (63%) completed postsecondary education. Three main themes were identified: 1) Taking time to self-reflect: Some participants described how the COVID-19 pandemic afforded them more time to learn more about themselves and connect with the (sometimes difficult) emotions they felt, which generally helped to manage stress; 2) Being perceived differently: Some participants described how they were perceived by their families, friends, and others at work or in public after feeling forced to disclose their vaccination status and/or RA diagnosis for the first time. Others expressed experiences of unequal treatment and/or a threat of violence from others, driven by historical and ongoing racism; 3) Participating differently in roles: Most participants experienced disruptions in how they participate in various social roles (eg, as a parent). Disruptions to valued social roles led some participants to describe taking time to reevaluate friendships or workplace situations, while some examined mental health and fitness regimens.
Conclusion: These lived experiences during the pandemic offer a unique opportunity to hear from individuals living with RA on how they experienced and renegotiated various dimensions of the self. Findings may be helpful for designing self-care programs and to assist healthcare professionals recognize the invisible work done by people with RA as they negotiate valued social roles, identity and sense of self during the pandemic.

TOUR26

COVID Infection in a Canadian Lupus Cohort: A Post-Omicron Update

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Table 1: Characteristics of the 75 SLE patients with COVID infection since the onset of the pandemic	
Female, N (%)	66 (88)
Age at last visit, mean (range)	46 (22-82)
Race/ethnicity, N (%)	
White	39 (52)
Asian	11 (16)
Black	11 (14.6)
Other	14 (18.7)
Mean SLE duration, years (standard deviation)	17.5 (9.6)
Vaccination status	
No vaccination	32 (42.6)
One dose	4 (5.3)
Two doses	25 (33.8)
Three doses	12 (16.0)
Four doses	2 (2.7)

Health Centre, Montreal); Sasha Bernatsky (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Montreal)

Objectives: SLE patients, their families, and their physicians were concerned that immunosuppressive medications may place them at high risk for COVID infection.[1] However, early (pre-Omicron) data from Canadian clinical cohorts did not point toward an excess of severe COVID. [2,3] To provide updated data including the post-Omicron era, we evaluated COVID infections in the Montreal General Hospital (MGH) Lupus Cohort and described characteristics of those experiencing COVID infections, including demographics, COVID vaccination, and outcomes.

Methods: The MGH Lupus cohort has enrolled unselected patients aged 18+ who meet American College of Rheumatology SLE criteria. Patients are evaluated yearly, reporting detailed clinical information including COVID infection and vaccinations (from 2020 onward), and hospitalizations. We included data from all clinic visits from January 2021 (start of vaccination availability) up to September 14, 2022, to determine the number testing positive for COVID (either clinic-based or home test) and describe their characteristics.

Results: From January 6, 2021, to September 14, 2022, 413 cohort patients had at least one clinic visit. Since the onset of the pandemic, 240 patients reported having taken a COVID test (in a clinic setting or at home) most frequently due to symptoms, with 75 patients (18.2% of the cohort with a study visit during this time) reporting a positive test at any time. The vast majority of infections occurred in the post-Omicron era. Almost half of patients reporting COVID infection were of non-White race/ethnicity. At COVID diagnosis, only 25 of 75 individuals were vaccinated with at least 2 doses;12 with a third dose, and 2 with a fourth dose (Table 1). Two individuals were hospitalized due to COVID, with one admitted for 7 days, and the other for 14 days including an ICU stay.

Conclusion: In this cohort, 18.2% of SLE patients experienced COVID infection since the availability of COVID vaccines (most post-Omicron), and two-thirds of those infected were unvaccinated or had only received one vaccination. Fortunately, hospitalization was uncommon and no deaths due to COVID were recorded. Patients experiencing COVID infection were often non-White suggesting that attention be paid to preventive strategies in this vulnerable sub-group. References [1.] Fu X. Lupus 2022;31(6):684-96. [2.] Liu JL. [Abstract 130]. J Rheumatol 2022;49(7):839. https://www.jrheum.org/content/jrheum/49/7/751.full.pdf. [3.] Yan L. [Abstract]. Arthritis Rheumatol 2022;74 Suppl 9. https://acrabstracts.org/abstract/sars-cov-2-vaccine-side-effects-and-infections-in-sle/

TOUR27

COVID-19 Prevalence Among Rheumatoid Arthritis Patients in Canadian Outpatient Clinic

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Table 1 - Patient drug usage during COVID-19 infection with treatment duration

Drug	n(%)	Treatment duration (days), median [IQR]
JAK inhibitors		
Tofacitinib	14 (18.67)	248 [1108]
Baricitinib	0	0 [0]
Upadacitinib	7 (9.33)	94 [61]
Anti-CD20		
Rituximab	12 (16.00)	1273 [1732]
IL-6		
Tocilizumab	18 (24.00)	429 [1090]
Sarilumab	0	0 [0]
Anti-TNF		
Infliximab	19 (25.33)	429 [1090]
Etanercept	38 (50.67)	3415 [3833]
Adalimumab	17 (22.66)	1447 [3430]
Golimumab	17 (22.66)	578 [1179]
Certolizumab	4 (5.33)	436 [220]
CTLA4-Ig		
Abatacept	19 (25.33)	787 [1058]
DMARDs		
Methotrexate	68 (90.66)	3538 [2861]
Sulfasalazine	23 (30.66)	189 [1956]
Leflunomide	49 (65.33)	507 [991]
Hydroxychloroquine	47 (62.66)	581 [2425]

Objectives: To assess the rate of COVID-19 infection and vaccination among patients with rheumatoid arthritis (RA) taking biologic agents, Janus Kinase inhibitors (JAKi), and disease-modifying antirheumatic drugs (DMARDs) in an outpatient clinical setting.

Methods: Using electronic health records derived from a single center (Ontario, Canada), patients treated with biologics, JAKi or DMARDs were identified. We included patients diagnosed with RA, positive for COVID-19, and with clinical visits post Jan-01-2020. COVID-19 results were obtained through self-conducted rapid-tests confirmation during visits with rheumatologist, calls to the office, or polymerase chain reaction tests attained through Ontario Laboratories Information System between Jun-01-2019 to Aug-01-2022. Our medications of interest were: JAKi (tofacitinib, upadacitinib, baricitinib), Anti-CD20 monoclonal antibodies (rituximab), Interleukin-6 inhibitors (tocilizumab, sarilumab), TNF-alpha inhibitors (infliximab, etanercept, adalimumab, golimumab, certolizumab), T-cell inhibitors (abatacept), DMARDs (methotrexate, sulfasalazine, leflunomide, hydroxychloroquine).

Results: Of the 560 RA patients reviewed, 75 were included (median age [IQR]: 63.02 [15.23], 14 [18.67%] male, median RA duration [IQR]: 5456 [3976] days) and identified to have tested positive for COVID-19. COVID-19 vaccination rate (minimum one vaccine) was 92.00% (median number of vaccines [IQR]: 3 [1]), with 51 patients (68.00%) receiving over three doses. The majority of patients (30 [40.00%]) tested positive prior to the first vaccine. Types of vaccines include Pfizer-BioN, Moderna, AstraZeneca, or combined. Of the JAKi and biologics used by individuals positive with COVID-19, etanercept was most prevalent (38 [50.67%]) with the longest median treatment duration (median [IQR] 3415 [3833] days), while methotrexate was the most prevalent DMARD (Table 1). Major symptoms exhibited during COVID-19 infection included cough (22 [29.33%]) and fever (20 [26.67%]). 16 individuals exhibited other symptoms after COVID-19 infection, including shortness of breath, non-ST-elevation myocardial infarction, and dyspnea (6 [37.50%]). There were 9 patient visits to the emergency room, 5 hospitalizations, 3 patients in intensive care units (1 tofacitinib/ 2 rituximab), and 2 deaths (1 rituximab/ 1 etanercept), all in relation to COVID-19.

Conclusion: COVID-19 prevalence among RA patients remains an important consideration for rheumatologists. A majority of infections occurred prior to first immunization. Infections affect patients on all types of advanced therapy, most of which the patient recovers from. Risk of COVID-19 did not seem to differ among types of medication, however rituximab was most present in severe responses after COVID-19 infection. Further scrutiny into long-term effectiveness of the vaccine and/or impact of COVID-19 in patients on biologics would be beneficial.

TOUR28

Safety Profile of COVID-19 Vaccinations in Patients With Rheumatoid Arthritis (RA) and Systemic Sclerosis (SSc)

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Objectives: Vaccine safety for patients with inflammatory-mediated diseases (IMID) is important as these patients may be prone to exaggerated vaccine responses such as more severe postvaccination symptoms, increased thromboembolic events, and worsening disease severity. With the COVID-19 pandemic, more robust data on the safety profiles of the currently available vaccines for IMID patients may improve vaccine guidelines and reduce vaccine misinformation. This study aims to explore the safety of COVID-19 vaccinations for patients with RA and SSc.

Methods: Patients with RA enrolled between April 2021 to Sept. 2022 at the Hamilton (McMaster) for the Safety and Immunogenicity of COVID-19 vaccines in Systemic Immune-Mediated Inflammatory Diseases (SUCCEED) study site were assessed at specific time points after each vaccine dose. The same methodology was applied for patients with systemic sclerosis (SSc). Patients were asked to complete self-report questionnaires regarding their experiences with the first 2 doses of their COVID vaccine. Information regarding the type of vaccine received, changes in their preexisting disease, local injection reactions (ie, swelling, pain, rashes), systemic reactions (ie, fever, nausea, diarrhea, joint pain) following each dose of the COVID vaccine, and other outcomes such as hospitalization were captured. Descriptive statistical analyses were used.

Results: Of the 43 RA and 21 SSc participants included for analysis, 81.4% were female and 18.6% were male for RA while 95.2% were female and 4.8% were male for SSc. The average age was 59 (SD = 23) for RA and 57 (SD = 11) for SSc. Pfizer was the most common vaccine for both doses. After Dose 1, the prevalence of any side effect was 51.2% and 33.3% for RA and SSc respectively and 44.2% and 42.9% respectively after Dose 2. The most common side effects after the first dose were sore arm/pain for both RA and SSc (39.5% and 19.0% respectively), as well as fatigue (19.0%) for SSc only. Similar patterns were seen for the second dose. For both RA and SSc, reported flare of disease was more common after the first dose. Moderna vaccination appeared to have a higher incidence of any side effect for both RA and SSc. No thromboembolic events were noted.

Conclusion: Overall, the incidence of adverse vaccine effects in both RA and SSc patients are low and most side effects are limited to local site reactions. There have been no severe side effects requiring urgent care or hospitalization. More data is required to confirm whether side effects are vaccine-specific.

TOUR29

Stringent Disease Activity Control at 2 Years Across Psoriatic Arthritis Domains Irrespective of Baseline Characteristics in Patients Treated With Guselkumab: Posthoc Analysis of a Phase 3, Randomized, Double-Blind, Placebo-Controlled Study

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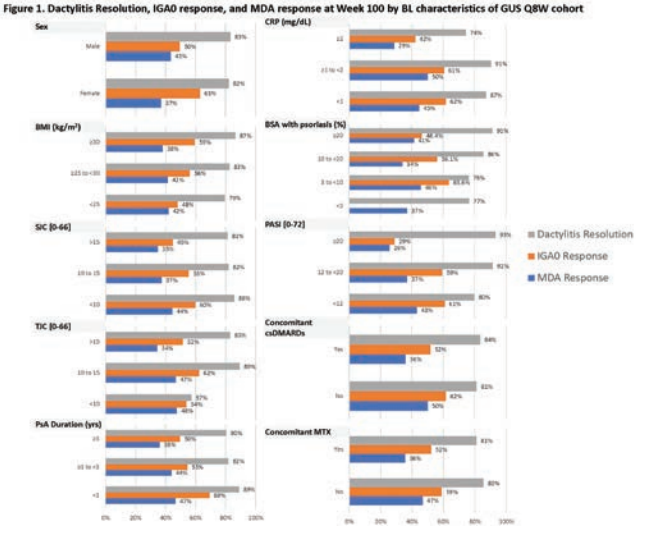
Objectives: Guselkumab (GUS) is associated with robust and sustained improvement in PsA signs and symptoms in subgroups of patients (pts) pooled from the phase 3 DISCOVER-1 and DISCOVER-2 (D2) trials, across a variety of baseline (BL) pt characteristics through 1, and 2 years (D2 only). In this posthoc analysis using D2 data, we evaluated the efficacy of GUS in inducing long-term (W100) stringent disease control in Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPPA)-recommended domains across BL characteristics.

Methods: D2 enrolled biologic-naïve adults with active PsA defined as ≥ 5 swollen and ≥ 5 tender joint counts (SJC; TJC) and CRP ≥ 0.6 mg/dL. 739 pts were randomized (1:1:1) and treated with GUS 100 mg Q4W (n = 245); GUS 100 mg at W0, W4, then Q8W (n = 248); or placebo (PBO; n = 246) with crossover to GUS 100 mg Q4W at W24. In this analysis, only GUS-randomized pts were included (n = 493). Achievement of the following outcomes at W100 was assessed: minimal disease activity (MDA), ACR 50% improvement (ACR50), ACR70, Investigator's Global Assessment score of 0 [clear skin] (IGA 0), Psoriatic Arthritis Disease Activity Score – low disease activity (PASDAS LDA), resolution of enthesitis and dactylitis, Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) response (≥ 4-point improvement), and Health Assessment Quality Disease Index (HAQ-DI) response (≥ 0.35-point improvement). BL characteristics of interest were pt sex, baseline BMI, SJC, TJC, PsA duration, CRP, % body surface area (BSA) with psoriasis, and PASI score, and use of conventional synthetic (cs) DMARDs and methotrexate (MTX). Non-responder imputation was used for missing categorical response data.

Figure 1. Dactylitis Resolution, IGA0 response, and MDA response at Week 100 by BL characteristics of GUS Q8W cohort



Results: 442 (90%) GUS-randomized pts completed study treatment through W100. With few exceptions, achievement of MDA response, IGA 0, and resolution of dactylitis (Figure 1) at W100 was demonstrated across a variety of baseline pt characteristics, without consistent differences in proportion of responders across pt subgroups of adequate sample size or between GUS dosing regimens. Similar trends were observed for achievement of ACR50, ACR70, PASDAS LDA, enthesitis resolution, FACIT-F response, and HAQ-DI response.

Conclusion: Irrespective of dosing regimen, treatment with GUS resulted in sustained achievement of several stringent endpoints spanning key GRAPPA-recommended domains through 2 years across a variety of BL demographic and disease characteristics. These results further support the long-term efficacy of GUS across the full spectrum of PsA disease domains and diverse PsA populations.

TOUR30

Sex-Related Measures of Inequity in Randomized Controlled Trials in Psoriatic Arthritis: A Systematic Literature Review and Metaanalysis

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Objectives: Through a systematic review and metaanalysis of randomized controlled trials (RCTs) in psoriatic arthritis (PsA), we aimed to assess sex-related dimensions of inequity by describing the proportion of studies reporting sex-disaggregated data and by comparing the efficacy of advanced therapies between male and female participants.

Methods: We performed a systematic literature search of Medline, Embase and Central databases and conference abstract archives from January 2000 to June 2022. RCTs that reported sex-disaggregated results and assessed the efficacy of an advanced therapy (biologic or targeted synthetic) in adult participants with PsA were included. Efficacy endpoints included the proportion of participants achieving minimal disease activity (MDA), or meeting the American College of Rheumatology 20 (ACR20) and ACR50 response criteria at the primary endpoint of the study. Random effects models were used to calculate pooled effects (Odds Ratio [OR] and 95% Confidence interval [CI])

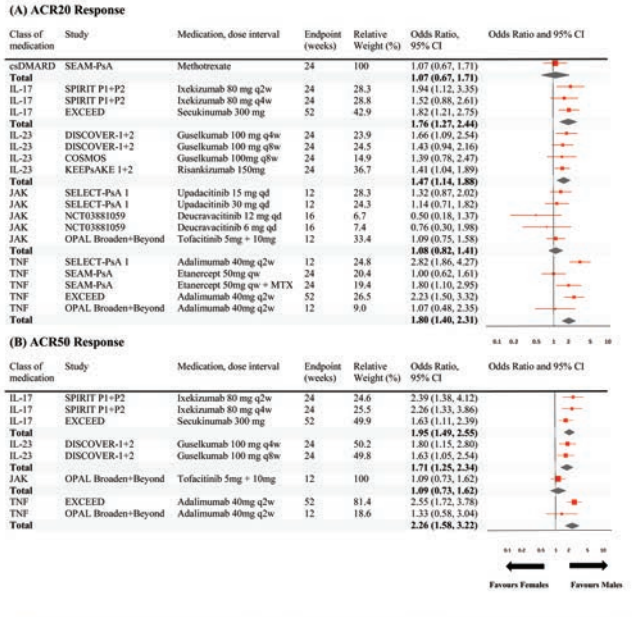

Figure 1. Random-effects meta-analysis of the efficacy of advanced therapies, by (A) ACR20 and (B) ACR50 responses, between male and female patients with psoriatic arthritis. 95% CI, 95% confidence interval; ACR, American College of Rheumatology; csDMARD, conventional synthetic disease-modifying anti-rheumatic drug; IL-17, interleukin-17 inhibitor; IL-23, interleukin-23 inhibitor; JAK, janus kinase inhibitor; MTX, methotrexate; QD, daily; QW, weekly; Q2W, every 2 weeks; Q4W, every 4 weeks; Q8W, every 8 weeks; TNF, tumour necrosis factor inhibitor.

for response in males vs. females for the different classes of advanced therapies.

Results: A total of 51 studies, including 21,603 participants, were included. The average percentage of male and female participants enrolled was 51.4% and 48.6%, respectively. Only five studies (10%) reported sex-disaggregated baseline characteristics, nine studies (18%) reported sex-disaggregated efficacy endpoints and one study (2%) reported sex-disaggregated safety endpoints. Differences in pooled estimates of efficacy endpoints were seen for males and females across the different classes of advanced therapies. The probability of achieving ACR20 response was higher in males vs. females for IL-17 (OR 1.76, 95% CI 1.27, 2.44), IL-23 (OR 1.47, 95% CI 1.14, 1.88) and TNF inhibitors (OR 1.80, 95% CI 1.40, 2.31), but not for JAK inhibitors (OR 1.08, 95% CI 0.82, 1.41) (Figure 1). Similarly, the probability of achieving ACR50 response was higher in males vs. females in all advanced therapies, except JAK inhibitors (OR 1.09, 95% CI 0.73, 1.62), however this analysis was based on fewer studies. The probability of achieving MDA was higher in males across all classes of advanced therapies, including IL-17 (OR 2.03, 95% CI 1.24, 3.34), IL-23 (OR 1.90, 95% CI 1.10, 3.29), TNF (OR 2.60, 95% CI 1.74, 3.90) and JAK inhibitors (OR 1.77, 95% CI 1.15, 2.73).

Conclusion: Female participants in RCTs are less likely to achieve efficacy end points for most classes of advanced therapies. Some differences in response outcomes were found across classes of advanced therapies. RCTs should report sex-disaggregated results to identify sex-related differences in efficacy and safety outcomes, which will inform patient-centered therapeutic strategies.

TOUR31

Time to Achieve Minimal Disease Activity for Ixekizumab Versus Adalimumab in Patients With Psoriatic Arthritis: Posthoc Analysis of SPIRIT-H2H

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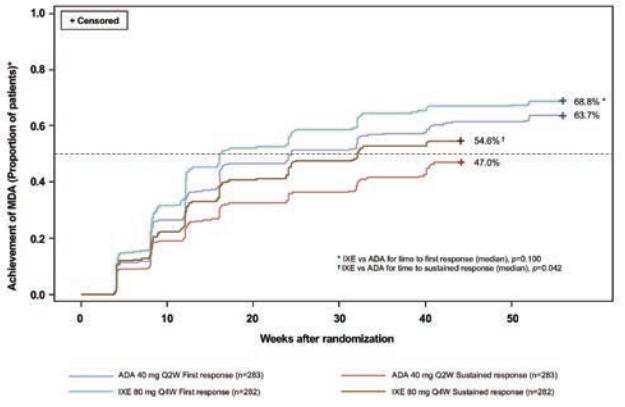
Objectives: To determine the time to achieve minimal disease activity (MDA) in patients with psoriatic arthritis (PsA) treated with ixekizumab (IXE) or adalimumab (ADA), and to enhance understanding of the dynamics of achieving MDA. Although remission is ideal, it is hard to achieve and maintain. MDA defines a satisfactory or desired state of disease activity, and a useful target for treatment, that is specific for PsA.



Methods: Patients had active PsA, met Classification for Psoriatic Arthritis criteria, had ≥ 3/66 swollen and ≥ 3/68 tender joints, active plaque psoriasis affecting ≥ 3% of body surface area, previous inadequate response to ≥ 1 conventional synthetic disease-modifying antirheumatic drugs (csDMARD) and were biologic DMARD and Janus kinase inhibitor naïve. Patients were randomized to receive approved dosing regimens of either IXE or ADA. Patients on csDMARDs at screening could continue a stable dose of csDMARD therapy. Kaplan-Meier analyses were used to estimate the time to reach first response and sustained response for MDA and its individual components, by treatment group over the 52-week observation period. Nonresponders were censored at the last available visit (day 392, last known day of the week 52 visit for first response) or at day 309 (last possible day to achieve a sustained response). For each separate analysis, patients who already fulfilled the individual criteria at baseline were excluded. Sustained response was defined as meeting response criterion at two consecutive visits, achieved on the first of these two visits. Time to response was compared between groups using log-rank test.

Results: Baseline demographics and characteristics were balanced between treatment groups. With IXE (N = 282) and ADA (N = 283), 194 (68.8%) and 180 (63.7%) patients achieved a first MDA during the 52-week period, respectively. Median time to first MDA response tended to be reached earlier with IXE than with ADA (16.2 weeks vs 24.4 weeks, $P = 0.100$) (Figure). A sustained MDA response was achieved by 54.6% of IXE-treated patients and 47.0% of ADA-treated patients. Median time to sustained MDA response was 32.1 weeks for IXE and could not be estimated for ADA-treated patients during the 52-week observation period ($P = 0.0421$) (Figure). The same trends were identified for all components of MDA.

Conclusion: A rapid and sustained response encompassing all aspects of the disease is an important treatment outcome for patients with PsA. Results of this posthoc analysis suggest that, in patients with PsA, time to first and sustained MDA response is likely to be shorter with IXE than ADA.

TOUR32

Performance of BASDAI Versus ASDAS in Evaluating Axial Involvement in Patients With PsA Treated With Guselkumab: Pooled Analysis of Two Phase 3 Studies

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Table 1. Correlation† of BASDAI and ASDAS with LEI, SJC, TJC, Physician Global, Pt Global, and Pt Pain at Baseline in Patients With and Without‡ Imaging-Confirmed axPsA

	Pts With axPsA (N=312)				Pts Without axPsA‡ (N=124)			
	BASDAI	mBASDAI	ASDAS	mASDAS	BASDAI	mBASDAI	ASDAS	mASDAS
SJC	0.20*	0.17*	0.18*	0.17*	0.18*	0.16	0.19*	0.18
TJC	0.29*	0.27*	0.21*	0.20*	0.12	0.11	0.14	0.14
LEI score	0.24*	0.23*	0.17*	0.16*	-0.04	-0.02	0.07	0.08
FACIT-Fatigue#	-0.56*	-0.55*	-0.37*	-0.34*	-0.56*	-0.56*	-0.50*	-0.47*
Physician GA	0.35*	0.33*	0.44*	0.43*	0.43*	0.41*	0.44*	0.43*
Pt GA	0.69*	0.64*	0.62*	0.59*	0.62*	0.59*	0.60*	0.57*
Pt Pain	0.66*	0.61*	0.62*	0.58*	0.70*	0.67*	0.70*	0.66*

†Correlation assessed with Pearson's correlation coefficient.
‡Although, per the study protocol, the BASDAI questionnaire was to be completed only by pts with primary PsA subtype of 'peripheral arthritis with spondylitis', inadvertently it was also completed by some pts without spondylitis as the primary subtype. Of the 124 pts without imaging-confirmed axial disease, 52 had polyarticular arthritis with absence of rheumatoid nodules, 44 had asymmetric peripheral arthritis, 20 had peripheral arthritis with spondylitis (not confirmed by imaging), and 8 had distal interphalangeal joint involvement.
*Asterisks indicate statistically significant ($p<0.05$) coefficients.
#Higher scores indicate worse fatigue.

Weak correlation: 0.20–0.39 | Moderate correlation: 0.40–0.59 | Strong correlation: 0.60–0.79

TOUR33

Is There a Correlation Between Skin and Musculoskeletal Activity in Psoriatic Arthritis (PsA)?

Dafna Gladman (Krembil Research Institute, Toronto Western Hospital, Toronto); Ghaydaa Aldabie (University of Toronto, Toronto); Fangya Mao (University of Waterloo, Waterloo); Mitchell Sutton (Toronto Western Hospital, Toronto); Ker-Ai Lee (University of Waterloo, Department of Statistics and Actuarial Science, Waterloo); Richard Cook (University of Waterloo, Department of Statistics and Actuarial Science, Waterloo)

Objectives: To assess the association between the extent and severity of skin psoriasis and musculoskeletal manifestations of PsA at baseline and over time.

Methods: An inception cohort of patients enrolled in a tertiary care clinic from 2000-2020 was analyzed. Patients are assessed according to a standard protocol including demographic information, clinical skin and joint assessments and laboratory evaluations at 6–12-month intervals. Skin activity is measured by the PASI score, and joint disease activity is measured by the number of tender and swollen joints. Axial disease is measured by the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and the Bath

Objectives: The Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) assesses activity of axial disease in PsA patients (pts), but only one of its questions addresses axial symptoms. The Ankylosing Spondylitis Disease Activity Score (ASDAS) excludes assessment of enthesitis, gives less weight to peripheral activity and is more objective than the BASDAI. This posthoc analysis compared the performance of BASDAI and ASDAS in evaluating symptoms of axial involvement in axial PsA (axPsA) pts.

Methods: Adult pts enrolled in DISCOVER-1/2 studies had active PsA despite standard therapies. Pts were randomized 1:1:1 to GUS 100 mg every 4 weeks (Q4W); GUS 100 mg at W0, W4, then Q8W; or placebo (PBO) with crossover to GUS Q4W at W24. axPsA was defined by presence of sacroiliitis based on previous radiograph or MRI confirmation. Data were pooled across treatment groups. In addition to BASDAI and ASDAS, modified versions excluding peripheral arthritis (mBASDAI/mASDAS) and enthesitis questions (mBASDAI) were calculated. Normalized (0-10 scale) versions of ASDAS and mASDAS were calculated based on maximum scores of ≈7 and ≈6.3, respectively. The correlation of BASDAI/mBASDAI and ASDAS/mASDAS with SJC, TJC, enthesitis, Functional Assessment of Chronic Illness Therapy (FACIT)-fatigue, pt pain, pt global, and physician global was assessed with Pearson's correlation coefficient. Cross-sectional and longitudinal (W52) effects of Leeds enthesitis index (LEI), SJC, and axPsA on BASDAI/mBASDAI and ASDAS/mASDAS were assessed with mixed models.

Results: 436 pts with baseline (BL) BASDAI information were included. In axPsA pts, BASDAI showed weak correlation with SJC, TJC, LEI, and physician global; moderate correlation with fatigue; and strong correlation with pt global and pt pain. Similar results were observed for ASDAS and modified versions. Among pts without axPsA, correlations of BASDAI and ASDAS with SJC, TJC, and LEI remained weak; correlations with pt global and pt pain remained strong (Table 1). Longitudinally, among pts with and without BL enthesitis, respectively, LEI and SJC showed significant but not clinically important associations with either outcome. Presence of axial disease was associated with significantly greater BASDAI and ASDAS scores, at BL and longitudinally, without differences in the incremental effect on BASDAI, normalized ASDAS, or their modified versions.

Conclusion: In pts with axPsA, the BASDAI and ASDAS performed similarly, with weak correlations with peripheral arthritis and moderate/strong correlations with pt fatigue and pain. They also showed similar ability to discern changes in axial disease activity suggesting that BASDAI and ASDAS are valid in assessing axial disease activity in PsA pts.

Table: Baseline characteristics of 397 patients	
Variable	Mean (SD)*, Number (%)** N=397
Age (years)	44.97 (13.01)*
PsA duration (years)	0.43 (0.66)*
Psoriasis duration (years)	14.64 (13.65)*
Married	236 (60.5)**
Smoker ever	193 (48.7)**
Alcohol intake	246 (62.3)**
Employed	309 (78.4)**
Post secondary education	277 (71.0)**
BMI	29.21 (8.85)*
PASI	6.11 (9.03)*
Nail	238 (61.2)**
Active joint count (tender ± swollen)	7.3 (13/15)*
Swollen joint count	2.96 (4.93)*
Axial disease	53 (17.8%)**
Treatment level	
None/NSAIDS only	272 (68.2)**
DMARDs ± NSAIDs	98 (24.7)**
Biologics ± DMARDs	27 (6.80)**

were calculated between PASI scores and joint counts and BASMI (in patients with axial disease). Multivariable analysis was carried out using negative binomial regression models for the joint counts and linear models for BASMI and BASDAI scores.

Results: The Table provides the characteristics of 397 patients enrolled within 12 months of PsA diagnosis. A significant correlation was found between PASI score and the total active joint count (AJC) (P = 0.01). Among patients on no treatment at the baseline assessment, a PASI score reduction by 1 was associated with a 2.4% reduction of AJC controlling for sex, age and psoriasis duration. There was no association between PASI score and AJC in patients taking conventional DMARDs (cDMARDs), while for those receiving biologic DMARDs (bDMARDs) a one-unit decrease in PASI was associated with a 3.9% reduction in AJC. When all longitudinal data were considered, in the absence of DMARDs, AJC was reduced by 4.8% on average with a PASI decrease of 1, while treatment with bDMARDs for each decrease of PASI of 1, the AJC decreased by 4.4% on average. Adjusting for sex, age, and PsC duration, we found a positive association between PASI and BASMI scores in all treatment groups at baseline. The longitudinal analysis showed that PASI is positively associated with BASMI among patients on cDMARDs. Among patients with axial disease, a positive association was found between PASI and BASMI at baseline in all treatment groups except cDMARDs; a positive association was found between longitudinal PASI and BASMI scores in all treatment groups.

Conclusion: In patients presenting within 12 months of diagnosis of PsA, there is an association between the severity of skin and joint or axial disease, both at baseline and longitudinally, but the nature of the association differs according to medication use.

TOUR34

The Association Between Exposure to Gut Dysbiosis-Inducing Medication and Immune-Related Adverse Events From Immune Checkpoint Inhibitor Therapy

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Objectives: Immune checkpoint inhibitors (ICI) have become first-line treatment for many cancers. Nevertheless, tumor response remains unpredictable and off-target immune-related adverse events (irAEs) can be severe and may require ICI discontinuation. A healthy gut microbiota is involved in ICI efficacy. However, cancer patients often need to take medications that can cause gut dysbiosis. When taken at the time of ICI initiation, exposure to gut dysbiosis-inducing medications has been associated with inferior ICI efficacy as well as irAEs. Little is known on the effect of gut dybiosis-inducing medications taken after the initiation of ICI. We aimed to determine whether exposure to antibiotics and other gut dybiosis-inducing medications after the initiation of ICI was associated with irAE. We hypothesized that exposure to antibiotics and other gut dysbiosis-inducing medications during treatment with ICI would be associated with irAEs.

Table 1: Baseline characteristics of cases and controls

	Cases n=36	Controls n=36	Univariate OR (95% CI)	p-value
Mean age, years (SD)	67 (14)	66 (15)	1.00 (0.97-1.04)	0.889
Sex				
Male	25 (69)	21 (58)	1.80 (0.60-5.37)	0.292
Female	11 (31)	15 (42)	0.56 (0.19-1.66)	0.292
Time from ICI initiation to index date, days (IQR)	163 (85-321)	94 (54-143)	1.01 (1.00-1.01)	0.02*
ECOG performance status				
0	14 (39)	10 (28)	1.57 (0.61-4.05)	0.350
1-2	22 (61)	26 (72)	0.64 (0.25-1.64)	0.350
Smoking status				
Never	22 (61)	17 (47)	2.00 (0.68-5.85)	0.206
Ever (past or current)	14 (39)	19 (53)	0.50 (0.17-1.46)	0.206
Cancer type				
Melanoma	11 (31)	4 (11)	0.36 (0.12-1.14)	0.08*
Renal cell	6 (17)	4 (11)	2.75 (0.88-8.64)	0.08*
Non-small cell lung	6 (17)	13 (36)	1.50 (0.42-5.32)	0.530
Gastrointestinal/hepatic	3 (8)	1 (3)	1.00 (0.20-4.96)	1.000
Head and neck squamous cell	3 (8)	3 (8)	2.00 (0.18-22.06)	0.571
Other	2 (6)	3 (8)	0.67 (0.11-3.99)	0.657
Cancer stage				
IV	27 (75)	28 (78)	0.875 (032-2.41)	0.796
III and below	9 (25)	8 (22)	1.14 (0.42-3.15)	0.796
ICI therapy				
Anti-PD-L1	3 (8)	1 (3)	3.00 (0.31-28.84)	0.341
Anti-PD-1	20 (56)	30 (83)	0.23 (0.07-0.81)	0.02*
Combination	5 (14)	2 (6)	4.00 (0.35-35.79)	0.215
Grade ≥3 irAE				
Colitis	8 (22)			
Endocrine	5 (14)			
Myocarditis	5 (14)			
Myositis	5 (14)			
Pneumonitis	5 (14)			
Hepatitis	4 (11)			
Dermatologic	3 (8)			
Arthritis	3 (8)			
Other	4 (11)			
Medications of interest 30 days pre-index date				
Antibiotic	4 (11)	4 (14)	1.00 (0.25-4.00)	1.000
Beta-lactam	3 (8)	4 (11)	0.75 (0.17-3.35)	0.706
Other	3 (8)	1 (3)	3.00 (0.31-28.84)	0.341
Proton pump inhibitors	14 (39)	11 (31)	1.60 (0.52-4.89)	0.410
Opioid	12 (33)	17 (47)	0.62 (0.25-1.49)	0.280
Pro-motility agent	4 (11)	9 (25)	0.38 (0.10-1.41)	0.147
Statins	15 (42)	12 (33)	1.60 (0.52-4.89)	0.410
Psychotropics	15 (42)	10 (28)	1.83 (0.68-4.96)	0.232
Angiotensin-receptor blockers	10 (28)	9 (25)	1.13 (0.43-2.92)	0.808
NSAIDs	5 (14)	3 (8)	1.67 (0.40-6.97)	0.484
Oral hypoglycemics	12 (33)	4 (11)	2.50 (0.49-12.89)	0.273
ACE inhibitors	7 (19)	5 (14)	1.67 (0.40-6.97)	0.484
Beta-blockers	4 (11)	2 (6)	2.00 (0.37-10.92)	0.423
Insulin	5 (14)	2 (6)	4.00 (0.45-35.79)	0.215
Alpha-blockers	5 (14)	2 (6)	4.00 (0.45-35.79)	0.215
Tumor responders	26 (72)	15 (42)	16.00 (2.12-120.6)	0.001

*Variables with p<0.1 were included in the multivariate analyses.

Methods: We performed a retrospective nested case-control study. Data were extracted from the Montreal Immune Related Adverse Events (MIRAE) Biobank and supplemented by a chart review. Cases were defined as patients with a CTCAE grade 3 or more irAE and the date of irAE as the index date. Cases were matched to controls without irAE on calendar date of index date. Exposure to gut dysbiosis-inducing medications in the 30 days prior to index date was compared between cases and controls using univariate and multivariate logistic regression. In univariate analyses, time from ICI initiation to index date, non-small cell lung cancer (NSCLC), melanoma, and PD-1 treatment were associated with irAEs with P < 0.1, and these variables were therefore selected as covariates for multivariate models. Statistical analyses were performed with the computing package R.

Results: Thirty-six cases (including 5 with myositis and 3 with arthritis) and controls were matched on index date (Table 1). Multivariate analysis showed no association between exposure to antibiotics 30 days prior to index date and irAEs (OR 0.91, 95% CI 0.13-6.58, P = 0.928). Exploratory analyses with exposure windows of 60 and 90 days yielded similar results. Similarly, no associations were found for specific classes of antibiotics and

other gut dysbiosis-inducing medications. Interestingly, cases were more likely to have tumor response than controls.

Conclusion: Exposure to antibiotics and other gut dysbiosis-inducing medications after ICI initiation was not associated with irAEs. Although our results are based on a small sample, these findings are reassuring for cancer patients who require gut dysbiosis-inducing medications during the course of ICI treatment. Larger studies are needed to confirm these findings.

TOUR35

"You Don't Put It Down to Arthritis": Qualitative Analysis of the First Symptoms Recalled by Individuals With Knee Osteoarthritis

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Objectives: The Osteoarthritis Research Society International (OARSI)–endorsed Early-Stage Knee Osteoarthritis (EsKOA) initiative is developing classification criteria for EsKOA to facilitate identifying and enrolling individuals into clinical trials of disease-modifying OA therapies to prevent progression to late-stage OA. To seek patient perspectives during the first phase of the initiative, we explored the first symptoms and experiences of knee osteoarthritis (OA) recalled by individuals with knee OA, using qualitative methods.

Methods: In this qualitative study, informed by the methodology of qualitative description, we analyzed focus group (n = 17 groups) and one-on-one interviews (n = 3) conducted with a total of 91 individuals living with knee OA in 2006 as part of an OMERACT/OARSI initiative to better understand the OA pain experience. Participants with knee OA were recruited from five academic hospitals in Australia, Canada, UK, and USA. Participants were purposively sampled for a range of disease duration and symptom severity. As part of each focus group or interview, participants were asked to describe their first symptoms of knee OA. From the transcripts, we conducted inductive thematic analysis, which included line-by-line coding, identifying repeated patterns across the data, and grouping data into themes.

Results: We developed four overarching themes: Insidious Onset, Must be Something Else, Early Symptoms, and Early Adaptations. Participants described the gradual and intermittent way in which symptoms of OA developed over many years; many could not identify a specific starting point. Many participants recalled a delay in self-identifying their symptoms as OA, often dismissing early symptoms, and not allowing themselves to believe the symptoms could be due to arthritis. Participants described diverse initial knee symptoms eg, activity-exacerbated joint pain, stiffness and crepitus, that were low intensity and strategies to compensate to allow continued participation in recreational or other daily activities. Participants reported placing greater importance on their knee symptoms, including seeking care, only when their physical function limited them from performing valued activities. Table 1 shows the themes with illustrative quotes.

Conclusion: This study illuminates the earliest symptoms and experiences of knee OA. Initial symptoms were insidious in onset, intermittent, low intensity, and often not attributed to arthritis. People with such symptoms would not fulfill current OA classification criteria, supporting the development of specific classification criteria for EsKOA.

Table 1. Themes and subthemes with illustrative quotes.

Theme, subtheme	Illustrative quotes
Theme: Insidious Onset	
Gradual tempo	*"I think initially, ahm, a lot of it started in an insidious way in that, ah, oh, you go to bed and your leg would be tired or it would be sore and achey, and you wouldn't think too much of it..."* - *FG-To2*
Episodic nature	*"It was like it would come on and then disappear, and come on again. I'd be in the shopping mall, I feel this, ah, just pain in my legs. And it continued like that."* - *FG-Tex3*
Delay to symptom registration	*"GW At the beginning when you first had it, was it just like a mild ache or ? K.7 Yeah, you didn't sort of take much notice of it really."* - *FG-UK2*
Theme: Must be something else	
Dismissal of first symptoms	"Well, because at first you're in denial and you don't--I mean I didn't think it was arthritis." - FG-Van1
Explaining away symptoms	"MC: When I was walking I felt--and I didn't imagine it (unclear) arthritis, I thought, well I must have done something to it, but I couldn't remember what." - FG-To5
Theme: Early symptoms	
Pain with activity	"Oh mine was a good many years ago, ten or twelve years ago, doing stairs, that's when I first noticed it." - FG-To3
Stiffness	"Mine started about ten to twelve years ago, but no pain, only stiffness." - FG-SA3
Joint crepitus	*"you get crunching"* - *FG-UK3*
Low intensity of symptoms	*"Intensity was not at much at first, but gradually more and more."* - *FG-To1*
Theme: Early adaptations	
Compensations	*"I didn't give up walking, and I just stayed more or less on a more level."* - *FG-Van1* *"So I guess I wasn't thinking arthritis, but it hurt to jog so I started walking, and that didn't seem to be a problem."* - *FG-Tex2*

TOUR36

Safety of COVID-19 Vaccines Varies Across Immune-Mediated Inflammatory Diseases

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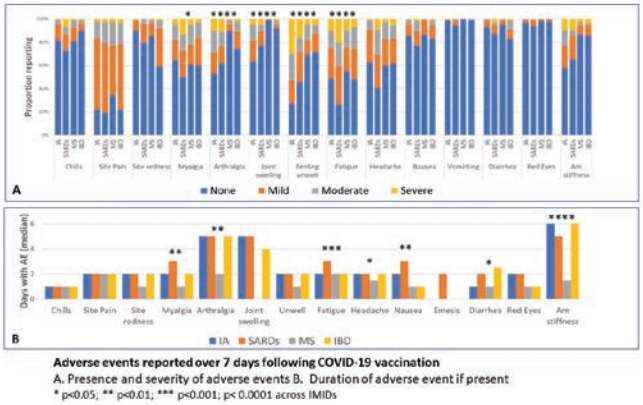
Objectives: People with immune-mediated inflammatory diseases (IMIDs) including inflammatory arthritis (IA), systemic autoimmune rheumatic diseases (SARDS), multiple sclerosis (MS), and inflammatory bowel disease (IBD) benefit from COVID-19 vaccines. Data on safety of COVID-19 vaccines for IMIDS are scarce. We evaluated the pattern of COVID-19 vaccine reactogenicity, and the association of reactogenicity with postvaccine activity/state and immunogenicity in people with IMIDs.

Methods: Participants with IMIDs [62 IA, 69 SARDS, 63 MS, 70 IBD; 80% female; age 56(15) years] self-reported the presence and severity of adverse events (AEs) daily for 7 days following each of 4 vaccine doses (reactogenicity), and completed measures of IMID activity/state and flare 1 month after each vaccination [Routine Assessment of Patient Index Data 3 (RAPID3), Systemic Lupus Activity Questionnaire (SLAQ), Expanded Disability Status Scale (EDSS), Inflammatory Bowel Symptom Inventory



Adverse events reported over 7 days following COVID-19 vaccination
A. Presence and severity of adverse events B. Duration of adverse event if present
* p<0.05; ** p<0.01; *** p<0.001; p< 0.0001 across IMIDs

Short Form (IBDSI-SF)]. Anti-receptor binding domain and anti-Spike IgG titers were assessed 1 month after each vaccination (immunogenicity). Descriptive statistics compared rates across groups. Multivariable models evaluated associations between reactogenicity burden (number of AEs) and a) IMID disease activity/state, b) flare, and c) immunogenicity. Covariates included sex, age, IMID category, vaccine sequence, and prior allergy (vaccine/drug/environmental).

Results: Most participants (90%) reported at least 1 AE (local AE 78% P = NS across IMIDs; systemic AE 74% P = 0.005 across IMIDs). Injection site pain (76%), fatigue (56%), headache (44%), myalgia (41%) and arthralgia (31%) were the most common reported AEs. Most AEs were mild or moderate and short-lived (median 2 days; range 1-6 days) but this varied across IMIDs (Figure). Constitutional AE (chills, fatigue, headache, feeling unwell) were most frequently reported in patients with SARDS (IA 57%, SARDS 78%, MS 51%, IBD 56% P < 0.0001); musculoskeletal AEs (joint pain/swelling, myalgia, morning stiffness) more frequent in IA (IA 47%, SARDS 38%, MS 10%, IBD 26% P < 0.0001) and gastrointestinal AEs (nausea, emesis, diarrhea) in IBD (IA 19%, SARDS 28%, MS 14%, IBD 27%). Fewer AEs were reported post BNT162b2. Although IMID activity/state scores were similar across visits, SARDS patients were 5x more likely than other IMIDs to report a moderate disease flare 1 month post vaccine (OR 4.8 2.3-9.9). A higher reactogenicity burden was associated with worse IMID activity for RA, SARDs, and IBD [B (95% CI B); RAPID3 0.6 (0.2-1.0), SLAQ 0.5 (0.1-0.8), IBDSISF 1.5 (0.4-2.5) (all P < 0.01)]. Reactogenicity burden did not associate with postvaccine seroconversion nor anti-SARS-CoV-2 titers.

Conclusion: Rates of AE in IMDs are comparable to the general population although the pattern of AE may vary across IMIDs. AE do not predict vaccine-mediated immunogenicity.

TOUR37

Cardiovascular Risk and Advanced Therapies Retention in Rheumatoid Arthritis: Results From the OBRI

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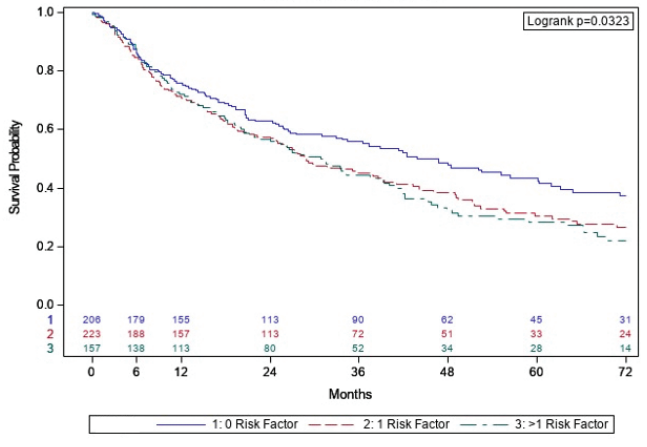
Objectives: Cardiovascular disease (CVD) is highly prevalent in rheumatoid arthritis (RA) and associated with morbidity and mortality. We previously demonstrated an association between CVD risk factors and higher disease activity and disability. In this study, we explored if CVD risk factors may lead to poor RA outcomes by evaluating the association between CVD risk factors and retention of biologic and targeted synthetic disease-modifying antirheumatic drugs (bDMARD, tsDMARD) among methotrexate inadequate responders (MTX-IR).

Methods: Participants enrolled in the Ontario Best Practices Initiative (OBRI) RA registry were included if they had ≥ 2 visits within ≥ 12 months, had active disease (clinical disease activity index [CDAI] > 10) and initiated their first bDMARD or tsDMARD. Patients were grouped based on the number of baseline CVD risk factors (0, 1 or > 1), including hypertension, dyslipidemia, diabetes, obesity (body mass index ≥ 30) or current smoking. The primary outcome was time-to-discontinuation of a first bDMARD or tsDMARD. A multivariable Cox proportional hazards model, adjusted for relevant confounders, was used to determine the association of number of CVD risk factors and medication retention.

Results: A total of 586 patients were included. bDMARDs were initiated in 91%, while the remainder initiated tsDMARDs. The mean (SD) age was 57 (13) years and 79% were females. Mean (SD) disease duration was 7 (8) years and mean (SD) CDAI score was 27 (11), reflecting high disease activity. The majority were seropositive (74%). At least 1 CVD risk factor was present in 38% while 27% had > 1 risk factor. Medication survival analysis by the CVD exposure groups is shown in the Figure. Patients without CVD risk factors had significantly better medication retention with median survival of 47 months, compared to 29 and 21 months in patients with 1 or > 1 risk factors, respectively (P = 0.03). The individual CVD risk factors were not found to be associated with medication retention. In multivariate analysis, the presence of 1 CVD risk factor was associated with a significantly higher risk of medication discontinuation (HR 1.37, 95% CI 1.06-1.77, P = 0.01) as was the presence of ≥ 2 CVD risk factors (HR 1.40, 95% CI 1.05-1.86, P = 0.02).

Conclusion: The presence of ≥ 1 CVD risk factor, compared to no risk factors, is associated with reduced initial bDMARD/tsDMARD retention among MTX-IR patients. Further investigation into the possible mechanisms is required to help determine if optimizing CVD risk factors can improve medication retention and RA outcomes.

Overall survival (medication retention) of first bDMARD or tsDMARD among MTX-IR responders, stratified by number of baseline CVD risk factors



TOUR38

Comparative Use of Secukinumab and Ixekizumab in the Real-Life Observational Cohort RHUMADATA™

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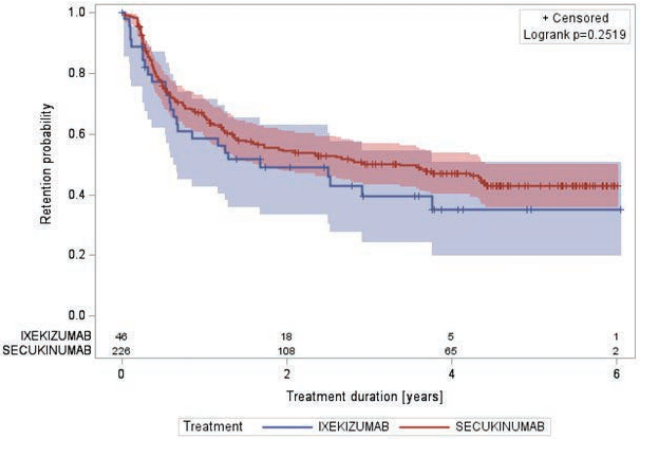
Objectives: Ixekizumab (IXE) and secukinumab (SECU) are human



monoclonal antibodies (IgG4 and IgG1k) that bind to the protein interleukin-17A. They are approved in Canada for the treatment of both axial (axSpA) and peripheral (pSpA) spondyloarthropathies. Comparing the efficacy and safety of these antibodies seems interesting.

Methods: RHUMADATA patients diagnosed with axSpA or pSpA initiating treatment with IXE or SECU were selected for this analysis if they provided informed consent and if treatment was started after August 2016 (date of the first IXE prescription). Data included demographics, disease, and treatment characteristics. Assessment of disease activity, including HAQ-DI, BASDAI and BASFI, were calculated at TI and 12 months. All patients were followed until they discontinued their treatment or until September 18, 2022, the date data was extracted. Drug retention rates were estimated and compared using Kaplan-Meier survival estimates curves.

Results: Out of 272 patients 226 and 46 initiated SECU and IXE, respectively (83 with axSpA and 189 with pSpA). Among SECU and IXE patients, the average age at diagnosis and treatment initiation was 44.0 (standard deviation (SD) 13.2) and 51.6 (13.1), respectively, and 56% and 54% were women. In the SECU group, the Charlson comorbidity index was 1.52 (1.58), while in the IXE group, it was 1.83 (1.79). The pSpA patients had erosions present in 25% (SECU) and 29% (IXE) of the assessed cases. The physician and patient global disease activity assessments at the start of treatment were 4.9 (2.4) and 5.5 (2.4), and 5.1 (2.4) and 5.4 (2.8) in the SECU and IXE groups. The HAQ-DI, BASDAI, and BASFI scores were respectively 1.30 (0.63), 5.8 (2.3) and 4.5 (2.6), and 1.11 (0.56), 4.8 (2.9) and 3.7 (2.5). TSECU and IXE had average retention rates of 2.59 (0.12) and 2.03 (0.24) respectively. Kaplan-Meier log-rank *P* value comparing retention between the two groups was 0.2519 (Figure 1). Physicians' and patients' global assessments of disease activity were 2.0 (2.1) and 3.6 (2.4) at one year, and 2.4 (1.7) and 3.1 (3.0) in the SECU and IXE groups. HAQ-DI, BASDAI, and BASFI scores were 0.86 (0.52), 3.8 (2.1), and 3.1 (2.3), and 0.71 (0.72), 3.8 (2.7), and 3.6 (3.0).

Conclusion: Although SECU had numerically higher retention than IXE, there was no statistically significant difference between the two. These medications appear to have similar effectiveness and patients improved similarly at one year.

TOUR39

Contemporary Burden of Disease and Disease Activity of Axial-SpA Patients in Quebec – Results From the RHUMADATA Database

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Objectives: To describe the contemporary burden of disease and disease activity among patients diagnosed with axial spondyloarthritis (axSpA) and treated with nonsteroidal antiinflammatory drugs (NSAIDs) or advanced therapies (ATs) in the RHUMADATA database.

Methods: Observational, retrospective analysis of RHUMADATA (Quebec, Canada). RHUMADATA was initiated in 1999 and collects data from all inflammatory arthropathies visiting 3 centers with 20 rheumatologists in the province of Quebec. RHUMADATA patients were eligible if they were adults at the time of axSpA diagnosis and were treated with NSAIDs or an AT (tumor necrosis factor inhibitor [TNFi] or interleukin [IL]-17 inhibitor) that was initiated between January 2010 and December 2019 and used for ≥ 12 months. For patients who had received > 1 AT during the eligible time window, the most recent therapy was used to perform this analysis. Residual disease activity (primary endpoint) was defined as failing to achieve low disease activity (LDA), with LDA defined as achieving a Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) score < 3 at 6 and 12 months following initiation of the latest axSpA therapy. Further assessments of burden of disease included functional impairment, using the Bath Ankylosing Spondylitis Functional Index (BASFI) score, C-reactive protein > 5 mg/dL, and level of axial pain, assessed using a visual analog scale (question 2 of the BASDAI).

Results: Overall, 708 subjects were included in this analysis. Mean (SD) age was 42.9 (12.6) years, 55% were male, 58 (8.2%) were taking NSAIDs only, 366 (51.7%) were taking their first AT, and 284 (40.1%) had taken at least one previous AT. The most common AT classes were TNFi (N = 594; 83.9%), and IL-17i (N = 56, 7.9%). Baseline mean (SD) BASDAI score was 5.72 (2.31); 391/457 (85.6%) subjects had a BASDAI score ≥ 3 (Table). By six months following AT initiation 183/315 (58.1%) of subjects were experiencing residual disease activity (BASDAI score ≥ 3), and by 12 months, this remained similar with 174 of 308 patients still with BASDAI score ≥ 3 (56.5%). Although disease activity, functional impairment, residual inflammation and axial pain seem to have improved overall from baseline (Table), a large proportion of patients still experienced residual burden of disease at 6 and 12 months following their latest therapy.

Conclusion: This analysis shows that despite the availability of ATs, more than half of patients with axSpA in the RHUMADATA database continued to experience residual disease activity 12 months after initiating their latest AT. Better therapeutic approaches are needed to achieve LDA in most patients with axSpA.

Table. Measures of disease activity at baseline, Month 6 and Month 12 after most recent treatment initiation

	Baseline	Month 6	Month 12
Residual disease activity (BASDAI ≥3)	391*/457** (85.6%)	183*/315** (58.1%)	174*/308** (56.5%)
BASDAI score (n, mean [SD])	457** 5.72 (2.31)	315** 3.79 (2.41)	308** 3.65 (2.37)
BASFI score (n, Mean[(SD])	452** 4.82 (2.61)	314** 3.22 (2.51)	307** 2.92 (2.35)
CRP >5 mg/dL	200*/344** (58.1%)	104*/269** (38.7%)	123*/343** (35.9%)
Axial pain VAS score[1] (n, mean [SD])	457** 6.33 (2.61)	315** 4.25 (2.77)	308** 4.08 (2.68)

1 BASDAI Question 2: How would you describe the overall level of AS neck, back, or hip pain you have had? Response VAS ranges from 0=None to 10=Very Severe. AS, ankylosing spondylitis; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASFI, Bath Ankylosing Spondylitis Functional Index; CRP, C reactive protein; VAS, visual analog score.
*Number of patients achieving the endpoint. **Number of patients with available assessment (may be lower than the total number of patients due to missing data).

TOUR40

Retention of Triple Therapy With Methotrexate, Sulfasalazine, and Hydroxychloroquine Compared to Combination Methotrexate and Leflunomide in Rheumatoid Arthritis, a Real-World Data From the Ontario Best Practices Research Initiative

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Objectives: 1. To assess the retention of triple therapy with methotrexate, sulfasalazine, and hydroxychloroquine compared to combination methotrexate and leflunomide (double therapy). 2. To compare the effectiveness of these treatment strategies at baseline, 6 months, and 12 months after treatment. 3. To investigate the causes of discontinuation of therapy and which agent of the combination was discontinued

Methods: The inclusion criteria were biologic and JAK inhibitor-naïve patients who received triple therapy or double therapy on or after OBRI enrolment between 2008-2022. Baseline characteristics examined included demographics, private health insurance status, smoking use, disease duration, comorbidities, concomitant steroid and NSAID use, lab values, swollen and tender joint counts, physician and patient global assessments, disease activity scores (CDAI, SDAI, DAS28), and HAQ scores.

Results: There were 692 patients included: 258 patients received triple therapy and 434 received double therapy. Statistically significant differences at baseline between the two groups included patients on double therapy being older (58.6 vs 55.3 years), having higher rates of private health

insurance (83.2% vs 74.6%), having longer disease duration (8.4 vs 5.8 years), being more likely to have a main comorbidity (43.5% vs 35.7%), and having higher DAS28 scores (mean 4.6 vs 4.3). Although patients on triple therapy numerically remained on treatment longer, this was not statistically significant. Baseline CDAI scores were similar between the two groups; however, at 6 months, patients on triple therapy were more likely to achieve low disease activity (42.2% vs 50.7%). Similarly, DAS28 scores were lower at 6 months in patients who received triple therapy (3.4 vs 3.9). Patients on triple therapy were more likely to achieve DAS28 remission at 6 months (30.1% vs 20.3%) and at 12 months (38.4% vs 30.5%). In multivariable analysis, risk factors for discontinuation of DMARD therapy were being female (HR 1.78) and having a comorbidity (HR 1.27). In patients who received double therapy, leflunomide was stopped more often than methotrexate (220 vs 67 patients). Patients on triple therapy stopped sulfasalazine more often than hydroxychloroquine and methotrexate (96 vs 50 vs 46 patients, respectively).

Conclusion: Although patients on triple therapy numerically remain on treatment longer, this was not statistically significant. Triple therapy was more likely to be associated with reaching low disease activity including remission at 6 months. Patients on triple therapy discontinued sulfasalazine more often, and patients on double therapy discontinued leflunomide more often. Patients who were female and those with at least one comorbidity were more likely to stop therapy.

TOUR41

M-Phase Phosphoprotein 1 Autoantibodies as a Biomarker for Cranial Neuropathies in an International SLE Inception Cohort

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Objectives: Cranial neuropathies (CN) are a rare but significant neuropsychiatric SLE (NPSLE) manifestation. In a single center SLE cohort, autoantibodies against the cytokinesis-associated protein M-Phase Phosphoprotein 1 (anti-MPP-1) were first reported to be associated with SLE-related cranial neuropathy (CN). This study further assessed anti-MPP-1 as a potential biomarker for CN in a large international SLE inception cohort.

Methods: SLE patients fulfilling the updated 1997 ACR classification criteria for SLE were included. Anti-MPP-1 antibody testing was performed on baseline (within 15 months of diagnosis) or first annual assessment samples using an addressable laser bead immunoassay (ALBIA) with purified recombinant human protein with results expressed as median florescence units (MFU). Based on healthy controls, a dilution of ≥ 1:500 MFU was considered positive. Univariate logistic regression was used to examine the association between anti-MPP-1 positivity and NPSLE manifestations (based on ACR case definitions using published NPSLE attribution rules [1,2]) occurring over the first 5 years of follow-up. For NPSLE manifestations associated with anti-MPP-1 positivity in the univariate analysis, baseline demographic and clinical characteristics were compared using T-tests and two-sample tests of proportions. Multivariable logistic regression analysis using penalized maximum likelihood estimates was then performed to assess the association between anti-MPP-1 and NPSLE manifestations associated with anti-MPP-1 positivity in the univariate analysis, adjusting for age at anti-MPP-1 testing, female, White race/ethnicity, and significantly different baseline clinical characteristics (Table 1).

Table 1. Multivariate analysis examining the association between MPP-1 positivity and cranial neuropathy within 5 years of follow-up

Covariates*	Cranial Neuropathy Positivity Odds Ratio (95%CI)
MPP1+ at baseline	**5.24 (1.44, 19.09)**
Age at MPP1 testing	1.01 (0.97, 1.06)
Female	0.58 (0.13, 2.49)
White ethnicity	1.44 (0.41, 5.07)
Hematologic disorder	3.04 (0.54, 17.10)
Antinuclear antibody	1.18 (0.07, 21.04)

*** Model covariates include MPP-1 positivity, adjusting for age at MPP-1 testing, female, White race/ethnicity, and significantly different clinical characteristics at baseline (ACR hematologic and antinuclear antibody criteria).**
Bold indicates statistically significant result

Results: Seven hundred and ninety-five SLE patients were assessed; 29.8% were anti-MPP-1 positive, 88.7% female, and 52.1% White. The frequency of anti-MPP-1 positivity differed only for those with (n = 10) versus those without (n = 785) CN (70.0% vs. 29.3%; odds ratio [OR] 5.16, 95% CI 1.44, 18.54). Compared to patients without CN, patients with CN were more likely to fulfill the ACR hematologic (difference: 23.9%, 95% CI 5.0%, 42.8%) and antinuclear antibody criteria (difference: 4.3%, 95% CI 2.9%, 5.8%). In a multivariate analysis, anti-MPP-1 positivity remained associated with CN (OR 5.24, 95% CI 1.44, 19.09) (Table 1).

Conclusion: Anti-MPP-1 is potential biomarker for CN in SLE. Further studies are needed to examine how antibodies to MPP-1, which is differentially expressed in a variety of neurological cells and tissues, contribute to disease pathogenesis and if anti-MPP-1 titers change with disease activity.

References: [1.] Hanly JG. Ann Rheum Dis 2020;79(3):356-62. [2.] Ainiala H. Arthritis Rheum 2001;45:419-23.

TOUR42

Association of Systemic Lupus Erythematosus Polygenic Risk With Neuropsychiatric Lupus in Two Multiethnic Cohorts

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Objectives: Neuropsychiatric systemic lupus erythematosus (NPSLE) is clinically heterogeneous and significantly affects the survival and quality of life of SLE patients. Genetics plays a role in SLE pathogenesis, but its role in NPSLE has not been determined. We investigated the association between SLE genetic susceptibility loci and NPSLE in two large, multiethnic cohorts of adult SLE patients.

Methods: Patients were recruited from either the Systemic Lupus International Collaborating Clinics (SLICC) Registry from 1999–2011 or the Toronto Western Hospital (TWH) Lupus Clinic from 1970–2021. Patients recruited to both cohorts were counted once as part of TWH. Patients were genotyped on the Illumina multiethnic or Omni 1-Quad arrays. Ungenotyped SNPs were imputed using TOPMed reference, and HLA alleles were imputed using the Multi-Ethnic HLA Reference Panel from the Michigan Imputation Server. Ancestry was genetically inferred using principal components and ADMIXTURE with the 1000 Genomes Project as a referent. NPSLE cases were defined as ever meeting the 1997 ACR SLE classification criteria for Neurological Disorder, including seizures and psychosis. The SLICC and TWH cohorts were analyzed

separately, then metaanalyzed using inverse variance weighting. SLE HLA and non-HLA polygenic risk scores (PRSs) were calculated using weighted log-odds-ratios. We excluded SLE HLA alleles with minor allele counts ≤ 12. We regressed with NPSLE outcome in binary logistic regression, adjusting for sex and ancestry.

Results: The study included 1617 adults diagnosed with SLE (896 from SLICC; 713 from TWH). The majority were female (89%) and of European ancestry (53%). The median age of SLE diagnosis was 32.1 years (IQR, 24.5-43.0). Median duration of follow-up was 10.6 years (IQR, 5.92-15.6). 173 patients (11%) had NPSLE. SLE HLA and SLE non-HLA PRS were not significantly associated with NPSLE in univariate and multivariable-adjusted models (SLE HLA: OR 1.02, 95% CI 0.81-1.27, P = 0.86; SLE non-HLA: OR 1.05, 95% CI 0.92-1.19, P = 0.51). Similarly, there were nonsignificant associations between SLE HLA and SLE non-HLA PRSs with NPSLE in the SLICC cohort (SLE HLA: OR 0.85, 95% CI 0.53-1.36, P = 0.51; SLE non-HLA: OR 1.04, 95% CI 0.83-1.3, P = 0.73) and in the TWH cohort (SLE HLA: OR 1.18, 95% CI 0.86-1.65, P = 0.30; SLE non-HLA: OR 1.06, 95% CI 0.81-1.38, P = 0.67).

Conclusion: We did not observe a significant association between polygenic risk scores for SLE and risk of NPSLE in a large multi-ethnic cohort of adults with SLE. Future analyses include single-allele association tests for SLE HLA alleles with NPSLE outcome and investigating the relationship between risk loci for psychiatric and mood diagnoses and NPSLE.

TOUR43

Serum Cytokine Profiling Reveals Elevated Levels of S100A8/A9 and MMP-9 in Systemic Lupus Erythematosus Patients With Cognitive Impairment Independently of Disease Activity and Inflammatory Markers

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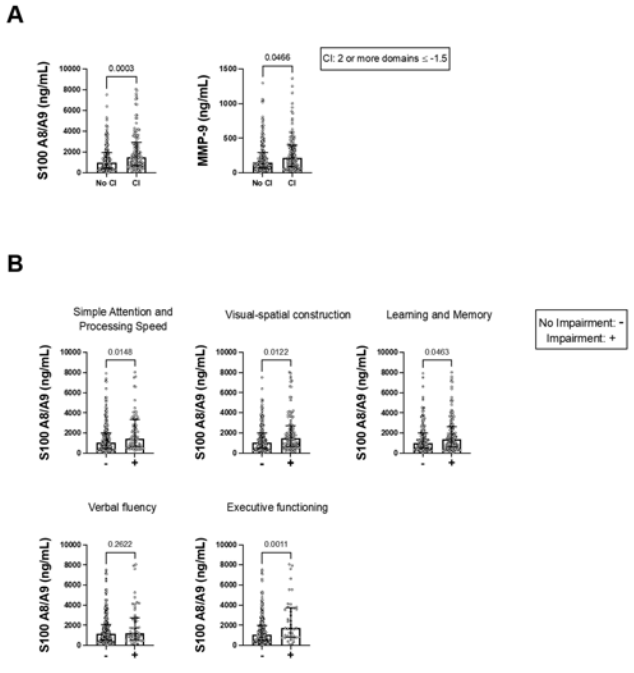

Figure 1. A) Serum levels of S100A8/A9 and, to a lesser extent, MMP-9 were significantly higher in patients with CI. B) Serum levels of S100A8/A9 according to the ACR-NB's cognitive domains. Statistical significance was determined using the Mann-Whitney U test. Each circle represents a single subject, with the top of the bar indicating the median for the subjects and error bars denoting the interquartile ranges.

Objectives: Cognitive impairment (CI) is one of the most common manifestations of Neuropsychiatric Systemic Lupus Erythematosus (NPSLE), which may occur in the absence of active SLE. Its pathogenesis is largely unknown, and currently, biomarkers for the risk of CI are lacking. Here we investigated whether SLE patients with CI have elevated serum levels of cytokines that previous studies have suggested to have a potential pathogenic role in NPSLE.

Methods: 291 individuals between 18-65 years old who met the 2019 EULAR/ACR classification criteria for SLE were included. Cognitive assessment was performed by a psychometrist and included the ACR-Neuropsychological Battery (ACR-NB). The serum levels of nine cytokines (cytokine profile) were determined using high-sensitive (hs) ELISA kits for IL-10, IL-6, IFN-γ, TNF-α, and NGAL, and Duoset (R&D Systems) for S100B, S100A8/A9, MMP-9, and TWEAK. Differences in the serum levels of the cytokine profile between patients with and without CI (z-score of ≤ −1.5 in ≥ 2 domains in the ACR-NB) were determined by the Mann-Whitney U test. Correlations were assessed using Spearman's rank correlation coefficient and the association of the different cytokine levels with each CI test score by logistic regression.

Results: 40% of the patients (n = 116) had CI. While no differences in the demographic characteristics and disease activity were observed between patients with and without CI, serum levels of S100A8/A9 and, to a lesser extent, MMP-9 were significantly higher in patients with CI (Figure 1A). When the ACR-NB's domains were examined individually, patients with impaired simple attention-processing; visual-spatial construction; learning and memory; or executive function also had higher S100A8/A9 than those without impairment (Figure 1B). Indicative of probable collinearity, S100A8/A9 and MMP-9 moderately correlated with each other (rho = 0.52, P < 0.0001) and both correlated with NGAL (rho = 0.64, P < 0.0001; rho = 0.56, P < 0.0001, respectively). S100A8/A9 had the strongest relationship with multiple CI tests by logistic regression. The serum levels of S100A8/A9 and MMP-9 did not correlate with TNF-α, IL-6, hs-CRP, or disease activity as determined by the SLE Disease Activity Index-2000 (SLEDAI-2K).

Conclusion: Only the heterodimer of the calcium-binding proteins S100A8 and S100A9 and MMP-9 were found to be increased in SLE patients with CI. The lack of correlation with the levels of other proinflammatory markers and its differential association with distinct cognitive domains may indicate that, in the setting of CI, S100A8/A9 mediates a regional neuroinflammatory response rather than systemic proinflammation. These results open new avenues to study the role of S100A8/A9 and MMP-9 in CI in adults with SLE.

TOUR44

Hospitalizations Due to Ambulatory Adverse Drug Events in Patients With Systemic Lupus Erythematosus

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Objectives: Patients with systemic lupus erythematosus (SLE) take multiple long-term medications, increasing their risk of adverse drug events (ADEs; harm from appropriate or inappropriate use of a drug). Within an SLE cohort, we evaluated consecutive emergency department (ED) visits leading to hospital admission to identify whether there was an associated ADE, and when present, ADE preventability.

Table 1: Characteristics of the study population at the time of first hospitalization in the observation period (n=45)

Characteristic	All first ED visits leading to hospitalization (n=45)	Subjects with ≥ 1 ADE (n=22)
Age, median years (IQR)	38 (27-53)	28.5 (22-40)
SLE duration, median years (IQR)	12 (6-20)	9 (3-14)
Age at diagnosis, median years (IQR)	27 (18-33)	20 (15-27)
Female sex, n (%)	41 (91)	20 (91)
Past/present smoker, n (%)	16 (36)	7 (32)
Years of education, median (IQR)	13 (11-16)	12 (11-16)
Race/Ethnicity, n (%)		
Caucasian	21 (47)	9 (41)
Indigenous	6 (13)	5 (23)
Asian	6 (13)	3 (14)
Black	7 (16)	2 (9)
Other	5 (11)	3 (14)
ACR criteria at diagnosis, n (%)		
Mucocutaneous	33 (73)	16 (73)
Arthritis	30 (67)	16 (73)
Serositis	21 (47)	11 (50)
Renal	19 (42)	10 (45)
Neurologic	5 (11)	2 (9)
Hematologic	37 (82)	17 (77)
Immunologic [a]	40 (89)	19 (86)
SLICC damage index [b], mean (SD)	1.6 (2.1)	0.95 (1.7)
≥1 item, n (%)	26 (58)	9 (41)
SLEDAI [c], median (IQR)	4.0 (2-8)	4.0 (2-8)
Number of current medications, median (IQR)	8 (4-11)	8 (6-10)
≥5 current medications, n (%)	33 (73)	19 (86)
Current medications, n (%)		
Prednisone	20 (44)	15 (68)
Mean prednisone dose, mg/day (SD)	22.6 (17)	31.7 (22)
Antimalarial	39 (87)	17 (77)
Aspirin and/or anticoagulant	15 (33)	5 (23)
Immunosuppressant use		
Mycophenolate mofetil	17 (38)	12 (55)
Azathioprine	5 (11)	4 (18)
Methotrexate	1 (2)	1 (5)
Tacrolimus	2 (4)	1 (5)
Cyclophosphamide	1 (2)	1 (5)
Biologics (belimumab, rituximab)	3 (7)	2 (9)
Location of admission, n (%)		
Medical ward	40 (89)	21 (95)
Higher acuity unit [d]	5 (11)	1 (5)
Length of hospital stay, median (IQR)	4 (2-8)	5.5 (3-11)

[a]Anti-dsDNA, anti-Sm, antiphospholipid antibodies [b]At most recent study visit (data available for 44/45 subjects)
[c]At most recent study visit [d]Coronary Care and Intensive Care Unit
Abbreviations: IQR, interquartile range, ED, emergency department; ADE, adverse drug event; SLE, systemic lupus erythematosus; SLICC, Systemic Lupus Erythematosus International Collaborating Clinics Damage Index; SLEDAI, Systemic Lupus Erythematosus Disease Activity Index

Methods: We identified all ED visits to the McGill University Health Centre among participants in the McGill SLE cohort between 2015-2020. For ED visits requiring admission, we extracted demographics and disease characteristics from the cohort database and recorded all usual home medications, the reason for visit, and outcomes. Two independent adjudicators evaluated each ED visit using the Leape and Bates scale to rank their confidence that an ADE contributed to the visit (1, little to no confidence; 6, virtually certain), using the kappa statistic to assess inter-rater reliability. ADE definitions included omission of indicated therapies, including nonadherence. Adjudicators classified ADEs as either potentially preventable/ameliorable or not.

Results: Among 481 patients followed in the SLE cohort between 2015-2020 (2303 person-years), 67 hospitalizations from the ED occurred among 45 patients (3 hospitalizations per 100 person-years). Median age at admission was 38 years (IQR 27-53), 41 (91%) were female, and median disease duration was 12 years (IQR 6-20). Patients took a median of 8 (IQR 4-11) medications (Table 1). Of the 67 hospitalizations from the ED, 27 (40%) were associated with ≥ 1 probable ADE (Leape and Bates scores 4-6), 6 (9%) were possible ADEs (score 3), and 34 (51%) were unlikely due to an ADE (scores 1-2). Four (6%) hospitalizations were linked to 2 ADEs. Inter-rater reliability was very good (unweighted kappa, 0.7). Almost a quarter (23%) of probable ADE-related hospitalizations occurred among indigenous patients. ADEs included infections in the context of immunosuppressants (42%), SLE flares associated with treatment nonadherence (19%), drug toxicities or adverse reactions (19%), and thrombosis (16%). Prednisone (39%) and/or other immunosuppressants (74%) were commonly implicated drugs. Twenty (65%) ADEs were potentially preventable/ameliorable. Modifiable factors included treatment adherence (38%), timely glucocorticoid tapering (14%), acting on laboratory results (19%), and institution of preventive measures (thromboprophylaxis, vaccination, infection screening, 20%).

Conclusion: Almost half of unplanned hospitalizations in this SLE cohort were related to probable/possible ADEs and two-thirds of these ADEs were potentially preventable or ameliorable. ADEs were primarily infections associated with glucocorticoids and/or immunosuppressants. At our center, co-designing strategies with the involvement of higher risk groups will be paramount.

POSTER PRESENTATIONS

1

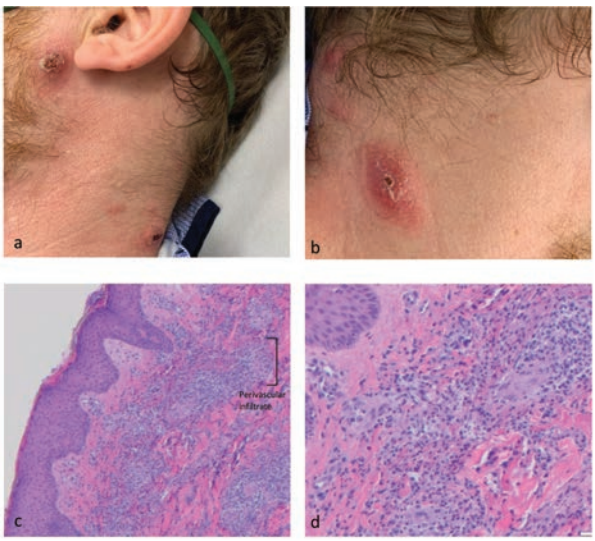
Early Sweet's Syndrome With Atypical Histopathology in a Patient With Axial Spondyloarthritis: A Case

Alexandra Kobza (University of Calgary, Calgary); Brandon Budhram (University of Calgary, Calgary); Mats Junek (McMaster University, Hamilton); Arthur Lau (McMaster University, St. Joseph's Healthcare, Hamilton)

Background: Axial spondyloarthritis (SpA) is an inflammatory arthropathy of the spinal column that is often associated with other manifestations including, but not limited to, skin changes and inflammatory bowel disease. One uncommon manifestation is Sweet's syndrome, a neutrophilic dermatosis.

Case: A 32-year-old male with axial SpA, well-controlled on Etanercept for the previous 15 years, presented to hospital with a two-week history of bloody diarrhea, five days of fever (up to 40°C) and nodules on his face and neck (Figure 1). On initial evaluation, he was febrile, tachycardic, and exhibited pathergy. The nodules were tender, erythematous, raised, and pustular. Investigations revealed a neutrophil-predominant leukocytosis, increased acute phase reactants, negative autoimmune serologies, and no evidence of infection. The patient was treated for a presumptive diagnosis of Sweet's syndrome and new-onset ulcerative colitis with prednisone at 1 mg/kg. Within 48 hours, the patient rapidly improved in both symptoms and vital sign abnormalities. A biopsy of a skin nodule demonstrated perivascular mixed cellular infiltrate with leukocytoclastic changes (Figure 1). Prednisone was tapered over the next month, and long-term maintenance therapy was changed to adalimumab.

Conclusion: Sweet's syndrome is an uncommon neutrophilic dermatosis that can overlap with leukocytoclastic vasculitis (LCV). This patient met one of two major criteria and all four minor criteria from the proposed 1994 classification system. While his skin biopsy would exclude a diagnosis of Sweet's syndrome using this criteria due to changes suggestive of LCV, it is increasingly recognized that there are multiple histopathologic findings in Sweet's syndrome. Indeed, some studies report the presence of LCV in Sweet's lesions to be up to 7-29%. In a study of Sweet's-like lesions with LCV, the histopathology suggested that the vasculitis was a secondary reaction to the noxious products released from the neutrophils, rather than a primary driver. Infiltrates composed predominantly of histiocytes and lymphocytes, as in our case, have also been described; and other data suggests that immature neutrophils may be mistaken for histiocytes. Because of these findings, we suspect that with a classic phenotype and mixed histopathologic findings, our patient's findings were ultimately consistent with Sweet's syndrome. These findings illustrate the difficulty of developing reliable diagnostic criteria in rare conditions such as Sweet's syndrome and emphasize the importance of synthesizing clinical, laboratory, and histologic findings.



2

Long-term Safety of Ixekizumab in Adult Patients With Psoriasis, Psoriatic Arthritis, and Axial Spondyloarthritis

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Objectives: We report long-term, end-of-study-program, safety outcomes in adult patients with psoriasis (PsO), psoriatic arthritis (PsA) and axial spondyloarthritis (axSpA) who received at least one dose of ixekizumab (IXE) over 5 years (PsO) or 3 years (PsA and axSpA).

Methods: An integrated safety analysis consisting of data from 25 randomized clinical trials (RCTs; 17 PsO, 4 PsA, 4 axSpA) was used to examine long-term safety of IXE. Rates of treatment-emergent adverse events (TEAEs), serious AEs (SAEs) and AEs of special interest were analyzed for all pooled studies by years of therapy and overall through March 2022, and reported as exposure-adjusted incidence rates (IRs) per 100 patient-years (PY) at successive year intervals. Additional safety outcomes included selected safety topics of interest (among others).

Results: A total of 6892 patients with PsO, 1401 patients with PsA, and 932 patients with axSpA, with a cumulative IXE exposure of 18025.7 PY for PsO, 2247.7 PY for PsA, and 2097.7 PY for axSpA were included in this analysis (Table). The IRs per 100 PY for any TEAE were as follows; patients with PsO = 32.5, PsA = 50.3, axSpA = 38.0. The most commonly reported TEAEs were nasopharyngitis (PsO, IR = 8.8; PsA, IR = 9.0; axSpA IR = 8.4) and upper respiratory tract infection (PsO, IR = 6.2; PsA, IR = 8.3; axSpA

Table: Safety outcomes across indications

	Pooled PsO IXE (N=6892)			Pooled PsA IXE (N=1401)			Pooled axSpA IXE (N=932)		
Total patient-years	18025.7			2247.7			2097.7		
Maximum exposure (days)	2236			1219			1241		
	n (%)	IR	95% CI of IR	n (%)	IR	95% CI of IR	n (%)	IR	95% CI of IR
TEAE[a, b]	5857 (85.0)	32.5	31.7, 33.3	1131 (80.7)	50.3	47.5, 53.3	798 (85.6)	38.0	35.5, 40.8
Mild	1799 (26.1)	10.0	9.5, 10.5	461 (32.9)	20.5	18.7, 22.5	276 (29.6)	13.2	11.7, 14.8
Moderate	3025 (43.9)	16.8	16.2, 17.4	556 (39.7)	24.7	22.8, 26.9	419 (45.0)	20.0	18.2, 22.0
Severe	1032 (15.0)	5.7	5.4, 6.1	114 (8.1)	5.1	4.2, 6.1	103 (11.1)	4.9	4.0, 6.0
Most Common TEAEs									
Nasopharyngitis	1592 (23.1)	8.8	8.4, 9.3	202 (14.4)	9.0	7.8, 10.3	176 (18.9)	8.4	7.2, 9.7
Upper respiratory tract infection	1114 (16.2)	6.2	5.8, 6.6	186 (13.3)	8.3	7.2, 9.6	122 (13.1)	5.8	4.9, 6.9
Injection site reaction[c]	698 (10.1)	3.9	3.6, 4.2	156 (11.1)	6.9	5.9, 8.1	156 (16.7)	7.4	6.4, 8.7
Bronchitis	410 (5.9)	2.3	2.1, 2.5	91 (6.5)	4.0	3.3, 5.0	72 (7.7)	3.4	2.7, 4.3
Sinusitis	384 (5.6)	2.1	1.9, 2.4	77 (5.5)	3.4	2.7, 4.3	39 (4.2)	1.9	1.4, 2.5
SAEs[a]	969 (14.1)	5.4	5.0, 5.7	134 (9.6)	6.0	5.0, 7.1	101 (10.8)	4.8	4.0, 5.9
Deaths	36 (0.5)	0.2	0.1, 0.3	6 (0.4)	0.3	0.1, 0.6	3 (0.3)	0.1	0.0, 0.4
AE leading to discontinuation (including death)	519 (7.5)	2.9	2.6, 3.1	115 (8.2)	5.1	4.3, 6.1	66 (7.1)	3.1	2.5, 4.0
AEs of Special Interest									
Infections	4307 (62.5)	23.9	23.2, 24.6	759 (54.2)	33.8	31.4, 36.3	540 (57.9)	25.7	23.7, 28.0
Serious Infections	231 (3.4)	1.3	1.1, 1.5	28 (2.0)	1.2	0.9, 1.8	23 (2.5)	1.1	0.7, 1.6
Opportunistic Infections	318 (4.6)	1.8	1.6, 2.0	40 (2.9)	1.8	1.3, 2.4	28 (3.0)	1.3	0.9, 1.9
Oral candidiasis	144 (2.1)	0.8	0.7, 0.9	16 (1.1)	0.7	0.4, 1.2	5 (0.5)	0.2	0.1, 0.6
Oral fungal infection[d]	11 (0.2)	0.1	0.0, 0.1	6 (0.4)	0.3	0.1, 0.6	3 (0.3)	0.1	0.0, 0.4
Esophageal candidiasis	14 (0.2)[e]	0.1	0.0, 0.1	2 (0.1)[e]	0.1	0.0, 0.4	5 (0.5)[e]	0.2	0.1, 0.5
Herpes zoster	120 (1.7)	0.7	0.6, 0.8	16 (1.1)	0.7	0.4, 1.2	12 (1.3)	0.6	0.3, 1.0
Candida infections	337 (4.9)	1.9	1.7, 2.1	45 (3.2)	2.0	1.5, 2.7	26 (2.8)	1.2	0.8, 1.8
Oral candida[b]	160 (2.3)	0.9	0.8, 1.0	22 (1.6)	1.0	0.6, 1.5	8 (0.9)	0.4	0.2, 0.8
Vulvovaginal candidiasis[f]	97 (4.4)	1.7	1.4, 2.1	13 (1.8)	1.1	0.7, 2.0	7 (2.5)	1.2	0.6, 2.5
Skin candidia/candidiasis	52 (0.8)	0.3	0.2, 0.4	5 (0.4)	0.2	0.1, 0.5	2 (0.2)	0.1	0.0, 0.4
Esophageal candidiasis	14 (0.2)	0.1	0.0, 0.1	2 (0.1)	0.1	0.0, 0.4	5 (0.5)	0.2	0.1, 0.6
Latent Tuberculosis	47 (0.7)	0.3	0.2, 0.3	15 (1.1)	0.7	0.4, 1.1	2 (0.2)	0.1	0.0, 0.4
Inflammatory bowel disease[f]	26 (0.4)	0.1	0.1, 0.2	3 (0.2)	0.1	0.0, 0.4	17 (1.8)	0.8	0.5, 1.2
Crohn's disease	10 (0.1)	0.1	0.0, 0.1	2 (0.1)	0.1	0.0, 0.4	7 (0.8)	0.3	0.2, 0.7
Ulcerative colitis	16 (0.2)	0.1	0.0, 0.1	1 (0.1)	0.0	0.0, 0.3	10 (1.1)	0.5	0.3, 0.9
Injection site reactions	1056 (15.3)	5.9	5.5, 6.2	260 (18.6)	11.6	10.2, 13.1	156 (16.7)	7.4	6.4, 8.7
Allergic reactions/hypersensitivities	1002 (14.5)	5.6	5.2, 5.9	102 (7.3)	4.5	3.7, 5.5	88 (9.4)	4.2	3.4, 5.2
Malignancies	141 (2.0)	0.8	0.7, 0.9	15 (1.1)	0.7	0.4, 1.1	9 (1.0)	0.4	0.2, 0.8
NMSC	54 (0.8)	0.3	0.2, 0.4	9 (0.6)	0.4	0.2, 0.8	0 (0.0)	0.0	0.0, 0.0
Malignancies excluding NMSC	94 (1.4)	0.5	0.4, 0.6	7 (0.5)	0.3	0.1, 0.7	9 (1.0)	0.4	0.2, 0.8
Depression[b]	215 (3.1)	1.2	1.0, 1.4	37 (2.6)	1.6	1.2, 2.3	19 (2.0)	0.9	0.6, 1.4
MACE[g]	91 (1.5)	0.5	0.4, 0.7	12 (0.9)	0.5	0.3, 0.9	6 (0.6)	0.3	0.1, 0.6
Cytopenias[w]	171 (2.5)	0.9	0.8, 1.1	56 (4.0)	2.5	1.9, 3.2	28 (3.0)	1.3	0.9, 1.9

[a]Data collection for the clinical trial database does not specify when events became serious and therefore the numbers shown may represent more serious events than what actually occurred during the treatment period. [b]Patients with multiple occurrences of the same event are counted under the highest severity. [c]1 missing case of severity in the PsO cohort. [d]Narrow term for PsA cohort. [e]The data includes 1 case considered severe, 9 cases considered moderate, and 4 cases considered mild. [f]Data included one case considered severe and one case considered moderate. [g]Data included 2 cases considered mild and 3 cases considered moderate [h]As reported by investigator. [i]Oral candida infection for the PsO study includes oral candidiasis, oral fungal infection, and oropharyngeal candidiasis; for the PsA study includes oral candidiasis and oral fungal infection. [j]PsO Cohort: Denominator adjusted because gender-specific event for females; N = 2196, PY = 5580.5. PsA Cohort: Denominator adjusted due to gender-specific event for women; n=722, patient-years=1142.2 (pooled IXE). axSpA Cohort: Denominator adjusted because gender-specific event for females; N = 282, PY = 592.8 (pooled IXE). [k]Data represent adjudicated cases. For the PsO cohort, the data represents cases classified as "definite" and "probable" per external adjudication. IR was calculated as the total of "definite" and "probable" cases /total patient-years, then multiplied by 100. There were 5 cases of adjudicated IBD that were not considered TEAEs. Total adjudicated IBD n=31 (IR of 0.2 per 100 PY, 0.4%). 5 additional cases confirmed by adjudication occurred either on the safety follow-up period (n=3) or on the placebo maintenance period after ixekizumab treatment (n=2). 3 patients with PsO had a history of IBD. For the axSpA cohort, 12 cases *de novo*, 5 patients had a history of IBD and experienced a flare during the study period. 1 additional case of IBD was reported in the safety follow-up. [l]Broad, according to Standardised MedDRA Queries (SMQ) or sub-SMQ classification. [m]Broad, according to SMQ classification. Abbreviations: IR, incidence rate per 100 patient-years; CI; confidence interval; IXE, ixekizumab; MACE, major adverse cerebro-cardiovascular event; N, number of patients in the analysis population; n, number of patients in each category; NMSC, non-melanoma skin cancer; PsA, psoriatic arthritis; PsO, psoriasis; AxSpa, axial spondyloarthritis; SAE, serious adverse event; SMQ, Standardised MedDRA Queries; TEAE, treatment-emergent adverse event.

IR = 5.8). Serious AEs were reported by 969 patients with PsO (IR = 5.4), 134 patients with PsA (IR = 6), and 101 patients with axSpA (IR = 4.8). Forty-five deaths were reported; (PsO = 36 [IR = 0.2]; PsA = 6 [IR = 0.3]; axSpA = 3 [IR = 0.1]). The IRs per 100 PY of discontinuation from the study drug due to AE were as follows: PsO, 2.9; PsA, 5.1; axSpA, 3.1. IRs of injection site reactions were: PsO, 5.9; PsA, 11.6; axSpA, 7.4. IRs of allergic reactions were: PsO, 5.6; PsA, 4.5; axSpA, 4.2. IRs of serious infections were low (PsO, IR = 1.3; PsA, IR = 1.2; axSpA, IR = 1.1). IRs of Candida were low across all indications (PsO, 1.9; PsA, 2.0; axSpA, 1.2), as were IRs of opportunistic infections (PsO, 1.8; PsA, 1.8; axSpA, 1.3). IRs were also low across all indications for depression, major adverse cerebro-cardiovascular events and malignancies (all IRs ≤ 1.6 (Table)). Cases of inflammatory bowel disease (IBD) were uncommon (IRs ≤ 0.8 across indications (Table)).
Conclusion: In this updated analysis with 18025.7 PY for PsO, 2247.7 PY for PsA, and 2097.7 PY for axSpA, IXE maintained a long-term safety profile up to 5 years, consistent with previous reports.

3

A Narrative Review Comparing Outcome in Medical Therapy vs Primary Surgical Intervention in Patient With Libman-Sacks Endocarditis

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Objectives: Libman-Sacks Endocarditis (LSE) or non-bacterial verrucous vegetative endocarditis, is a cardiac manifestation that can be found in autoimmune diseases such as Lupus and antiphospholipid syndrome.[1] Similar to infective endocarditis, LSE can lead to detrimental complications, including stroke, heart failure and ischemic limbs.[2,3] However, given the rarity of the disease, there is no specific guideline on whether medical management is more advantageous than the surgical approach. The goal of this study is to review the existing literature reported on the treatment of LSE in autoimmune diseases to determine if there is a difference in the adverse outcomes and mortality between medical and surgical treatment.
Methods: A systematic search of Medline, Embase, Scopus and Web of Science was performed from database inception to June 28th, 2022. Any cases describing the use of any treatment, including surgical procedures and medical therapy on LSE or non-infective endocarditis, were included. Malignancy-related causes of LSE, pediatric population, and articles in foreign languages other than English, French or Chinese were excluded from this study. Study and patient characteristics were extracted as well as outcomes (ischemic limb, stroke, bleeding, heart failure, mortality). Extracted data were summarized descriptively since meta-analysis was not possible due to heterogeneity of the study designs and outcome reporting.
Results: We identified 1255 articles in the initial search, of which 142 articles were included for analysis. A total of 171 patients were involved, with most cases reported in females (61%), and the average age at presentation was 39.6 ± 2.31. Lupus and antiphospholipid syndrome made up the majority of cases. Mitral valve was the most common site for vegetation to develop (109 cases) with mitral regurgitation being the most reported valvular dysfunction. 67% of patients were treated medically (anticoagulation, immunosuppressants, or corticosteroid) while 57% were treated with surgical procedures (excision, valvular repair, replacement), with 17% of patients treated with both medical and subsequent surgical approach. The proportion of complications from LSE was low but included heart failure (2.5%), and stroke (1.9%). The mortality rate observed was 5.7% in all the patients, with 7.9% in medical patients in comparison to 1.8% in surgical patients.
Conclusion: This study revealed that medical therapy was the mainstay treatment approach for LSE. However, based on the studies reported thus far, medical management may have a higher risk of adverse outcomes. Therefore, further controlled studies are needed to elucidate the mortality and morbidity benefit between surgical and medical therapy in LSE.
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4

A Canadian Patient-Driven Survey to Highlight Which Prednisone-Related Side Effects Matter the Most to Patients With Vasculitis

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Objectives: Management of vasculitis has evolved for the last two decades; however, glucocorticoids (GC) remain the cornerstone of the treatment. Although the side effects (SE) of prednisone are well recognized by the clinicians, their importance for the patients with vasculitis has not been investigated as extensively as in other rheumatological conditions.
Methods: An online questionnaire was developed to survey vasculitis patients about their experience and SE of prednisone. The questionnaire consisted of questions about standard demographics and diagnosis, 5 questions about their prednisone dose and duration, 21 about specific SE (+ rating of some these pre-specified SE, and a free text box to report any other relevant SE), and 4 about knowledge and perception about possible alternatives to prednisone (namely, avacopan). Three rounds of invitation to complete the survey were sent by the Canada VF to their members. We compared answers between patients with GPA/MPA or other vasculitis.
Results: The survey was open from May 1, 2022, to July 30, 2022. A total of 97 patients (53 GPA/MPA, 43 other vasculitides) completed the survey. The mean age was 56.9, with a mean disease duration of 10.6 years. Their mean

Table: Demographics, prednisone dose and duration, and prednisone-related side effects of the patients

	GPA/MPA n: 53	Other Vasculitidies n: 44	P value
Age (years), Mean (SD)	56.7 (14.5)	57.2 (15.9)	0.932
Female	39 (73.6)	36 (81.8)	0.335
Disease duration (years), Mean (SD)	9.9 (7.3)	11.3(11.2)	0.735
Total prednisone time (months), Mean (SD)	52.5 (59.4)	74.6 (104.5)	0.635
Still received prednisone	22 (41.5)	26 (59.1)	0.085
Current dose of prednisone (mg), Mean (SD)	7.4(5.5)	9.2 (6.7)	0.100
Prednisone related side effects of the patients			
Quality of life	51 (96.2)	43 (97.7)	0.570
Increase of acne	21 (39.6)	21 (47.7)	0.423
Skin bruising or thinning	42 (79.2)	41 (93.2)	**0.050**
GI symptoms	40 (75.5)	37 (84.1)	0.296
Weight gain	51 (96.2)	40 (90.9)	0.255
Insomnia	49 (92.5)	42 (95.5)	0.431
Mood change	52 (98.1)	41 (93.2)	0.242
Anxiety or depression	46 (86.8)	40 (90.9)	0.380
Lower self-esteem	41 (77.4)	40 (90.9)	0.073
Night sweats	43 (81.1)	39 (86.6)	0.309
Body disfiguration (moon face or torso hump etc.)	51 (96.2)	38 (86.4)	0.083
Hip bone AVN requiring hip replacement	0	1 (2.3)	0.454
Diabetes requiring medication	8 (15.1)	10 (22.7)	0.241
High blood pressure requiring	21 (39.6)	14 (31.8)	0.280
Infections requiring antibiotics	28 (52.8)	22 (50.0)	0.471
Severe infection required hospitalization	8 (15.1)	6 (13.6)	0.537
Bone fracture	6 (11.3)	6 (13.6)	0.483
Osteoporosis needed treatment	12 (22.6)	12 (27.3)	0.385
Osteoporosis	15 (28.3)	14 (31.8)	0.438
Cataracts	15 (28.3)	18 (40.9)	0.138
Loss of tooth mass or teeth	12 (22.6)	14 (31.8)	0.216
Knowledge and perception about possible alternatives to prednisone			
Ever heard about Avacopan	30 (56.5)	13 (29.5)	**0.008**
Ever taken Avacopan	0 (0)	0 (0)	-
Would you prefer to go back on prednisone or be one of the first patients, outside of any study, to take a very new medication such as Avacopan, instead of, or with less, prednisone?			0.290
New medication (Avacopan)	33 (62.3)	33 (75.0)	
Back on Prednisone	6 (11.3)	5 (11.4)	
Not sure	14 (26.4)	6 (13.6)	

GPA: Granulomatosis Polyangiitis; MPA: Microscopic Polyangiitis SD: Standard Deviation; AVN: Avascular necrosis

duration of GC use was 62.7 ± 83.7 months, and 49.5% of patients were still on GC (daily dose, 8.4 ± 6.2 mg). All the patients reported ≥1 GC-related SE, with 67.1 (%) of them reporting having had ≥11/19 pre-specified SE of interest. 51.5 percent of patients reported having had infections (14.4% severe); 36.1% of patients reported hypertension, and 18.5% diabetes (Table). Among ranked SEs, acne was ranked with the lowest score, whereas moon face/torso hump had the highest ranking, just above weight gain, insomnia and decreased quality of life. Around half of the GPA/MPA patients and one-third of the others have heard about avacopan, and 68% of patients (similarly in both groups) stated they would prefer being the first to take a very new medication, such as avacopan, instead of prednisone.

Conclusion: This patient-driven survey emphasizes the patient experience and perspectives on GC-related SE, with weights given to some SEs that may differ from those given by physicians. GC toxicity indexes should reflect this better, and alternative treatment options should be developed.

5

Cannabis Use in Inflammatory Arthritis: Characteristics and Comparisons Between Users and Non-Users

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Objectives: Advances in inflammatory arthritis (IA) treatment in the last 20 years have made it possible to mitigate symptoms and disease progression. However, even when well-managed, some symptoms may remain, and occasional flares will occur. Anecdotal reports suggest that cannabis can help with symptoms, but the literature on this remains unclear.[1] The objectives of this study were to describe rates of self-reported cannabis use in the past year, reasons for use, and compare disease and psychosocial metrics among cannabis users and non-users.

Methods: The present study was a secondary analysis of cross-sectional data from an online survey to identify help-seeking behaviors and strategies for improving sleep in people with IA. Participants were recruited through arthritis organizations (Arthritis Consumer Experts, Arthritis Research Canada, and Patients Intéressés par la Recherche en Arthrite) and social media ads on Facebook, Instagram, and Twitter. After informed consent was obtained, respondents self-reported on cannabis use frequency and reasons for use. Standardized measures were used to assess fatigue, sleep and psychosocial functioning.

Results: A total of 265 participants were included. About a third reported cannabis use in the past year (89/265; 34%). The majority (81%) of users reported using cannabis for medical (ie, non-recreational) purposes only. Main reasons for use were chronic pain (71/89; 80%), sleep difficulty (50/89; 56%), and anxiety/nerves (17/89;19%). T-tests revealed that past-year cannabis users reported higher disease activity levels, worse overall health and more pain, fatigue, depression, and stress. All effect sizes were small-to-moderate, with the strongest effect on pain. Refer to Table 1 for more details.

Table 1. ***Disease and Psychosocial Metric Comparisons***

		T-Tests					*Effect Sizes*	
					95% CI			
Variable	**Scale**	***Mean Difference***	**df**	**sig.**	**Upper**	**Lower**	**SMD**	**Cohen's d**
Age	Years	0.03	263	0.985	-3.29	3.35	12.97	0.07
Disease duration	Years	0.18	262	0.254	-0.13	0.50	1.24	0.15
Disease Activity†	0-10	0.86	262	0.017	0.16	1.57	2.76	0.31
General health‡	1-5	**-0.27**	**261**	**0.005**	**-0.46**	**-0.08**	**0.74**	**-0.37**
Pain†	0-10	**1.07**	**262**	**0.002**	**0.41**	**1.73**	**2.57**	**0.42**
Fatigue†	0-10	**0.95**	**262**	**0.005**	**0.29**	**1.60**	**2.56**	**0.37**
Fatigue	MFI	-0.57	263	0.275	-1.59	0.46	4.00	-0.14
Insomnia	ISI	1.58	263	0.068	-0.12	3.27	6.62	0.24
Sleep quality	PSQI short	0.75	263	0.100	-0.14	1.65	3.50	0.22
Depression	PHQ-2	**0.63**	**262**	**0.003**	**0.22**	**1.05**	**1.61**	**0.39**
Stress	PSS-4	**1.18**	**262**	**0.004**	**0.39**	**1.98**	**3.09**	**0.38**
Anxiety	GAD-2	0.41	262	0.063	-0.02	0.83	1.67	0.24

SMD, Standardized Mean Difference; MFI, General Fatigue Subscale of the Multidimensional Fatigue Inventory; PHQ-2, Patient Health Questionnaire-2; ISI, Insomnia Severity Index; PSS-4, Perceived Stress Scale -4; GAD-2, Generalized Anxiety Disorder Scale-2; PSQI-short, Global score of the Perceived Sleep Quality Index Short Form. † 0-10 numerical scale with higher scores denoting worse symptom severity. ‡ 1-5 numerical scale with higher scores denoting better health.

Conclusion: Past year cannabis use was somewhat more common among respondents with inflammatory arthritis than what has been reported in the general Canadian population (34% vs 27%),[2] although most only used it for medicinal purposes (ie, pain, sleep problems, anxiety). Cannabis use was associated with significantly worse disease characteristics (pain, fatigue, perceived health, disease status) and psychosocial wellbeing (stress, depression). More robust research is needed to determine whether findings are replicable and directionality. Best Abstract by a Rheumatology Post-Graduate Research Trainee Award. References: [1] Gonen T. Rambam Maimonides Med J 2020;11(1):e0007. [2.] Health Canada. https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/canadian-cannabis-survey-2020-summary.html

6

Determinants of Depression Among Individuals With Inflammatory Arthritis

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Objectives: The risk of developing depression is two times higher among Canadian adults with than without arthritis. Little is known regarding the determinants of depression among individuals with arthritis. This knowledge is important to help identify persons at risk and address modifiable risk factors. The objective of our study was to identify the determinants of depression among individuals with inflammatory arthritis (IA).

Methods: We performed a cross-sectional study using baseline questionnaire data from a randomized controlled trial of an employment intervention; "Making It Work," an online self-management program to improve work outcomes among adults with IA. Participants were recruited in British Columbia, Alberta and Ontario through rheumatologist practices, consumer organizations, arthritis programs, and a health benefit plan, between 07/2013 and 04/2017. Depression was assessed using the Patient Health Questionnaire (PHQ-9, range: 0-27). Potential determinants included sociodemographic, health and work-related variables (Table 1). Multivariable linear regression analyses were performed to identify independent determinants of depression (PHQ-9 continuous variable), with forward variable selection based on highest adjusted R-squared, selecting the smallest model in the selection list with adjusted R-squared within 0.01 of the highest (for additional parsimony).

Results: The sample included 564 adults (mean (SD) age: 45.7 (9.9) years, 77.8% female, 81.5% Caucasian, 19.7% had spondylitis, 17.0% psoriatic arthritis, 13.7% lupus or another connective tissue disease and 49.7%

Table 1: Determinants of Depression Among Individuals With Inflammatory Arthritis, results of multivariable linear regression analysis

Variables*	Beta Estimates	p value	Partial Adjusted R-squared	Cumulative Adjusted R-squared
Insomnia (Insomnia Severity Index)	0.3053	<.0001	0.1766	0.3981
Job Strain (Gignac)	0.9844	<.0001	0.0466	0.4910
Number of Limiting Comorbidities	0.7714	<.0001	0.0592	0.5253
Fatigue, Global NRS	0.3978	<.0001	0.0588	0.5508
Job satisfaction (Job Content Questionnaire)	-0.5271	.0125	0.0111	0.5550

Variables evaluated as potential determinants which were not selected in the final model included sociodemographic variables (age, gender), living situation (living with partner, married, single), disease-related variables (arthritis type, disease activity [Rheumatoid Arthritis Disease Activity Index (RADAI)], physical function [Health Assessment Questionnaire (HAQAII)]), and work-related variables (self-employment, job autonomy, supervisor support, coworker support, arthritis-work spillover and decision latitude at work [Job Content Questionnaire]).

rheumatoid arthritis). Mean (SD) depression score was 7.20 (5.08), indicating mild depression. Determinants of depression selected in the final multivariable model included: insomnia, job strain, number of limiting comorbidities, fatigue and low job satisfaction. All determinants explained 55.50% (adjusted R-squared) of the variance in depression. Insomnia contributed most to depression (partial adjusted R-squared) and explained 17.66% of the variance after controlling for all variables in the model, and 39.81% of the overall variance in a univariable model. Limitations: The cross-sectional nature of this study prevents assessing temporality criteria for causation. Many determinants (insomnia, fatigue, job strain, low job satisfaction) could be consequences of depression. Insomnia is one diagnostic criteria for major depressive disorder. The study sample included workers with IA, predominantly Caucasian, highly educated, with longstanding disease. Results may not be generalizable to individuals with differing characteristics.

Conclusion: Individuals with inflammatory arthritis are at increased risks of depression. We identified that insomnia, job strain, comorbidities, fatigue, and low job satisfaction were determinants of depression in our sample. Discussing these determinants during health care encounters may benefit patients. Further research is needed to determine directionality of the associations identified.

7

Hypertrophic Pulmonary Osteoarthropathy Improves With Immune Checkpoint Inhibitor Therapy

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Background: Hypertrophic pulmonary osteoarthropathy (HPOA) is a paraneoplastic syndrome characterized by abnormal proliferation of the skin and osseous tissues at the distal extremities. HPOA is commonly associated with metastatic lung cancer. To our knowledge, there are no documented reports on the isolated effect of immune checkpoint inhibitor therapy on HPOA. After obtaining patient consent, retrospective chart review was performed and pertinent

Case: medical history, clinical findings and investigations are reported. A 66-year-old Caucasian man with NSCLC, a 25-pack year smoking history and no prior arthritis was referred to the clinic. He complained of new-onset, worsening pain and swelling in his fingers, left wrist and knees of six months duration. A locally recurrent adenocarcinoma (Stage IIIA, cT4) had been resected from his right lateral tracheal wall three months after symptom onset. He also received two doses of adjuvant therapy with cisplatin and pemetrexed at that time. On presentation he was found to have enlargement of his PIP joints without synovitis, and clubbing in his fingers. On investigation, RF and anti-CCP antibodies were negative, and CRP was within normal range. Plain X-rays of the hands showed periosteal thickening along the ulnar aspect of the proximal phalanx of the second digit bilaterally and right third digit consistent with HPOA. After the first treatment with durvalumab therapy and without other interventions for symptom management the patient-reported decrease in arthralgias, and resolution of arthralgias after five treatments of ICI therapy.

Conclusion: HPOA is an uncommon paraneoplastic syndrome that causes arthralgias and bone pain, on which the effect of ICI therapy is unknown. Our case illustrates that ICIs may have positive implications in the treatment of HPOA.

8

Accessing Telehealth and In-Person Healthcare During the COVID-19 Pandemic: Experiences of Individuals With Rheumatoid Arthritis

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Objectives: The COVID-19 pandemic has provided opportunity to increase integration of virtual healthcare with in-person practices. Individuals with rheumatoid arthritis (RA) continue to self-manage their illness while navigating the period of uncertainty in health service delivery systems. Telehealth options for arthritis management during the pandemic were uneven as systems were developed and providers trained to use them. Understanding individuals' experiences will inform the integration of telehealth into routine practice post-pandemic. One aim of our qualitative study was to explore the experiences of individuals with RA accessing telehealth and in-person care.

Methods: The study was jointly designed and conducted with patient partners living with RA. Between December 2020 and December 2021, we conducted one-to-one semi-structured interviews (30-70 minutes) with participants with RA. Participants were purposively sampled from an ongoing randomized controlled trial (RCT) testing a web-based self-management intervention. Eligible participants had: (1) a diagnosis of RA; (2) no joint surgery in the past six months; (3) no acute injury to any joints in the past six months; (4) an email address and daily access to an internet-accessible device. We aimed for maximum variation in age, sex, and education, within the limits of the RCT sample. A reflexive thematic analysis approach was used.

Results: Thirty-nine participants (aged 26-86; 36 females; 13 diagnosed with RA between 2019-2021) were interviewed. Three preliminary themes were identified: (1) Deciding between telehealth and in-person: Many individuals preferred telehealth under certain conditions (eg, prescription renewal, minimize traveling for appointments). Others favored in-person consultations for ease of explaining symptoms during a physical assessment; (2) Assessing risk of in-person visits: When in-person consultations were preferred, some feared contracting COVID-19 when traveling for the consult while others felt safe with the health measures in place; and (3) Adapting to systemic disruptions: Some participants struggled with accessing care as health service delivery changed during the pandemic; patients' in-person appointments were turned virtual or canceled without notice. Others were forced to be flexible given the suspension of in-person clinical care (eg, receive a consult outside in the rain).

Conclusion: Our interviews suggest people with RA appreciate having a choice between telehealth and in-person consults to meet their needs, are cautious about accessing health services in-person, and are forced to adjust to obstacles in accessing healthcare. Understanding these perspectives help inform the use of telehealth beyond the pandemic by addressing patient concerns, personalizing telehealth options, and integrating telehealth into clinical practice for routine check-ups.

9

Decision-Making Around Vaccination and Other Public Health Measures During the COVID-19 Pandemic: Experiences of Individuals With Rheumatoid Arthritis

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Objectives: Individual decisions about adopting public health measures (eg, vaccination programs, physical distancing) to reduce COVID-19 transmission have implications for individuals with rheumatoid arthritis (RA) in their everyday self-care. One aim of our qualitative study was to explore how decision-making about adopting public health recommendations influenced self-care experiences of individuals with RA.

Methods: The study was jointly designed and conducted with patient partners with RA. Between December 2020 and December 2021, we conducted one-to-one semi-structured interviews (30-70 mins) with adults with RA. Participants were purposively sampled from a randomized controlled trial (RCT) testing a web-based self-care intervention. To be eligible, participants had: (1) a physician confirmed diagnosis of RA; (2) no joint surgery in the past six months; (3) no history of acute injury to any joints in the past six months; (4) an email address and daily access to a computer or mobile device. We aimed for maximum variation in age, sex, and education, within the limits of our RCT sample. A reflexive thematic analysis approach was used.

Results: Thirty-nine participants (aged 26-86; 36 females) were interviewed. Preliminary themes are: (1) Respecting freedom of choice: Many participants felt fortunate to be able to adopt public health measures to maintain involvement in meaningful activities, such as being physically active. Some, however, described how their choice to adopt these measures was challenged, explaining how they defended their freedom to choose to others (eg, relatives). Many emphasized their respect for others' freedom to choose, even though others' choices complicated participants' self-care decisions; (2) Feeling a moral responsibility: Participants felt a responsibility to protect the welfare of their families and wider community as an important driver in their decision-making to adopt public health measures. Some described adapting their self-care to ensure this responsibility was upheld; (3) Differing trust in information sources: Participants described different forms and changing degrees of trust they placed in health professionals and other sources (eg, public health officials, media, friends) when making decisions about public health measures.

Conclusion: Findings offer a glimpse into how decision-making around public health measures raised ethical tensions (around participants' expressed freedom of choice, social responsibility, and trust) in the self-care experiences of individuals living with RA. Our findings thus may serve to sensitize researchers, health professionals, and policymakers in supporting decision-making about public health measures in ways that value the experiences of individuals with RA and other autoimmune diseases during the pandemic and beyond.

10

A Closer Look at the Difficult-to-Treat Rheumatoid Arthritis Patients

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Objectives: With increasing numbers of advanced therapies, rheumatologists increasingly see Rheumatoid Arthritis (RA) patients who have failed multiple therapies. The management of difficult-to-treat (D2T)-RA patients is challenging, with no clear guidance on how to approach, and there is an unmet need to understand the factors leading to D2T-RA. In this analysis, we aimed to compare the disease characteristics and activity of our D2T-RA patients from the biologics clinic with the rest of the group.

	Difficult-to-treat RA		
	No (N:16) n(%)	Yes (N:6) n(%)	p
Demographics			
Sex: Female	10 (62,5%)	6 (100%)	0,133[a]
Age; *Mean±SD*	58,9±16,8	56,8±15,6	0,799[b]
Smoking (ever)	11 (68,8%)	3 (50,0%)	0,624[a]
Alcohol	8 (50,0%)	3 (50,0%)	1,00[a]
Disease Features			
RF positive	9 (60,0%)	3 (50,0%)	1,00[a]
anti-CCP positive	7 (50,0%)	3 (50,0%)	1,00[a]
CRP positive	6 (37,5%)	2 (40%)	1,00[a]
ESR positive	6 (37,5%)	3 (60,0%)	0,611[a]
Disease duration (years)	6,0 (14,1)	24,5 (10,8)	**0,008**[c]
Erosive disease	9 (56,3%)	4 (66,7%)	1,00[a]
Deformities	5 (31,3%)	4 (66,7%)	0,178[a]
Extraarticular disease	5 (31,3%)	3 (50,0%)	0,624[a]
Comorbidities			
Heart disease	4 (25,0%)	0 (0%)	0,541[a]
Stroke	2 (12,5%)	0 (0%)	1,00[a]
Angina	3 (18,8%)	0 (0%)	0,532[a]
Osteoporosis	5 (38,5%)	2 (40%)	1,00[a]
Depression	7 (43,8%)	3 (50,0%)	1,00[a]
Urate	288 (79)	376 (139)	**0,039**[c]
Framingham CVD risk score	5,55 (16,39)	8,10 (6,43)	0,823[c]
Previous therapies			
Previous number of csDMARDs	3 (1)	1,5 (3,0)	0,178[c]
Previous number of advanced therapies	0 (1)	4 (3)	**<0,001**[c]
Disease activity/clinical			
Morning stiffness	8 (57,1%)	6 (100%)	0,115[a]
Duration of morning stiffness (hours)	0,75 (1,0)	0,75 (1,0)	0,353[c]
Swollen joint count (66)	7,5 (8,0)	8,0 (9,0)	0,541[c]
Tender joint count (68)	6,5 (19,0)	11,5 (18,0)	0,178[c]
Patient VAS	3,5 (4,0)	6,5 (4,0)	0,098[c]
Physician VAS	4,5 (2,0)	7,0 (4,0)	0,070[c]
HAQ	0,94 (1,28)	1,43 (0,97)	0,083[c]
CDAI	15,5 (15,0)	31,0 (28,0)	0,115[c]
DAS28ESR	3,75 (1,88)	4,70 (1,09)	0,153[c]
DAS28CRP	3,68 (1,76)	4,17 (1,60)	0,590[c]
Disease activity/ultrasound			
Ultrasound: GLOESS score	29,5 (24,0)	55,5 (50,0)	0,098[c]
Ultrasound: Doppler score	8,0 (17,0)	10,0 (36,0)	0,541[c]

RF: Rheumatoid factor, Anti-CCP: cyclic citrullinated peptide, CRP: C-reactive protein, ESR: Erythrocyte Sedimentation rate, CVD: Cardiovascular Disease, csDMARD: conventional syntactic Disease Modified anti-rheumatism Drug, VAS: visual analogue scale, HAQ: Health Activity Questionnaire, CDAI: Clinical disease activity index, DAS: Disease activity score, GLOESS: Global synovitis score

[a]: Fisher exact test [b]: Independent samples t test [c]: Mann Whitney U Test

*All numeric variables given as median (Inter quartile range).

Methods: Biologics clinic is a new initiative at the Ottawa Hospital aiming to improve the long-term outcomes of patients with inflammatory arthritis. Patients who are about to start or switch to another advanced therapy are evaluated at the biologic's clinic. Extensive data regarding disease history, medication exposure and disease activity measures are collected in a standard fashion; the comorbidity burden is documented and managed. A protocoled ultrasound is conducted at baseline and three-month intervals, until reaching remission. Within these patients, D2T-RA patients were defined as failure of ≥ 2 biologics therapy.[1] Here we present the results from a pilot exploratory comparative analysis to understand the differences between the D2T-RA patients with the rest of the cohort.

Results: Six (27.3%) of 22 RA patients fulfill the definition of D2T-RA. Strikingly, all D2T-RA patients were females despite the 62% in the other group (Table). Seropositivity was similar across groups, although there is numerically more erosive disease in the D2T-RA patients (66.7% vs 56.3%).

Two groups were similar in terms of the comorbidities, except urate levels which tend to be higher in D2T-RA patients. D2T patients have numerically higher tender joint counts as well as higher scores on US. Other disease activity scores, including DAS28-CRP and ESR, CDAI and HAQ, also tend to be higher in D2T-RA patients than the rest of the group.

Conclusion: Higher disease activity in the ultrasound suggests an uncontrolled inflammatory process rather than untreated on-inflammatory pain mechanisms. D2T-RA patients were only females, highlighting the importance of incorporating sex into research and understanding the factors leading to poor response in this group. Higher urate levels in D2T-RA may be due to increased disease duration, although the comorbidities were not more frequent. It would be noteworthy to look at the impact of MSU crystals on joints' resistance to therapies. With higher number of patients and longer follow-up, our group is aiming to find predictors of D2T-RA and investigate alternative therapies including stemcell transplant. References: [1.] Nagy G. Ann Rheum Dis 2021;80(1):31-5.

11

Is Virtual Care Here to Stay?: Rheumatology Patients' Satisfaction in Early vs Late Pandemic

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Objectives: The COVID-19 pandemic has dramatically changed the delivery of healthcare, with virtual care becoming the new standard. In the early stages of the pandemic, physicians were very creative to rapidly adapt to virtual care and studies reported high levels of patient satisfaction.[1] It is unclear whether this high level of satisfaction would be maintained long term, after patients experience multiple virtual visits. We aimed to compare patients' satisfaction with virtual visits in the early and late period of the COVID-19 pandemic and to determine the factors impacting patient' satisfaction.

Methods: Patients who had at least one phone visit during the early pandemic and enrolled in a previous survey study were invited to participate in this follow up study.[1] Patients received a similar survey to reflect their satisfaction levels for their later visits between Aug 2021-May 2022. Chi-square tests was used for comparisons for early vs late pandemic satisfaction levels and factors impacting the satisfaction levels were investigated using multivariate logistic regression analysis.

Results: A total of 741 and 270 patients responded to surveys in the early and late COVID-19 pandemic periods respectively. Patient demographics for both periods were similar for age, sex and diagnosis. Overall satisfaction levels decreased in the later stages in comparison to the early stages (89% vs 81.2%, respectively, $P = 0.003$) (Table). Despite the reduced satisfaction levels in the late period, 55.5 % of the patients still declared their willingness to continue with virtual care even after the pandemic, a similar result to early pandemic ($P = 0.871$). In multivariate analysis, speaking with a rheumatologist ($P = 0.035$; OR (95% CI) 1.921 (1.047-3.526)), being called on-time ($P < 0.001$; 4.807 (2.330-9.915)) and capability of using a telephone ($P < 0.001$, 4.361 (2.503-7.597)) were found to be associated with overall satisfaction in the early period. In the late period, being called on-time ($P = 0.038$; 2.333 (1.046-4.768)) and capability of using the telephone ($P = 0.001$; 3.516 (1.729-7.150)) were found to be associated with overall satisfaction. However, there was no association between speaking with a rheumatologist vs a resident and overall satisfaction in the late COVID-19 pandemic period ($P = 0.263$; 1.639 (0.690-3.892)).

Conclusion: Our results suggest that while the patients' satisfaction with the virtual visit decreased slightly over time, approximately 80% of the patients remain satisfied with virtual care. In addition, more than half of the patients support ongoing virtual visits after the pandemic. This study has important implications for policy decision makers as they consider resource allocation for long-term virtual care. References: [1.] Goldhar HA. Clin Rheumatol 2022;41(9):2839-44.

Table: Comparison of factors affecting patient satisfaction in early and late Covid-19 pandemic period.

	Early Covid-19 pandemic period				Late Covid-19 pandemic period			
	Overall satisfied				Overall satisfied			
	No	Neutral	Yes	p	No	Neutral	Yes	P
Age category (yrs) n (%)								
18-40 yrs	4(10)	1(2.5)	35(87.5)	0.109	0	1(11.9)	8(88.9)	0.864
41-70 yrs	14 (3.6)	25 (6.4)	353 (90.1)		13(9.4)	12(9.4)	114 (81.3)	
>70 yrs	9(3.1)	26 (9.1)	251 (87.8)		9(8)	13(11.5)	92 (80.5)	
Capability using a telephone n (%)								
Very capable	16(2.7)	31 (5.1)	555 (92.2)	**<0.001**	11 (5.4)	18 (8.8)	176 (85.9)	**0.001**
Somewhat capable	6 (6.9)	12 (13.8)	69 (79.3)		6 (14.3)	8 (19)	28 (66.7)	
Very limited capability	5 (16.7)	8 (26.7)	17 (56.7)		4 (33.3)	1 (8.3)	7 (58.3)	
Sex n (%)								
Male	11 (5.4)	15 (7.4)	177 (87.2)	0.262	6 (8)	8 (10.7)	61 (81.3)	0.983
Female	15 (2.9)	36 (7)	463 (90.1)		16 (8.6)	19 (10.2)	151 (81.2)	
Doctor spoken to n (%)								
Staff	16 (2.8)	38 (6.6)	525 (90.7)	**0.017**	20 (9)	19 (8.6)	182 (82.4)	**0.036**
Only resident	10 (8.1)	8 (6.5)	105 (85.4)		2 (5.7)	8 (22.9)	25 (71.4)	
Telephoned approximately on time n (%)								
Disagree	6 (26.1)	0	17 (73.9)	**<0.001**	3 (15)	4 (20)	13 (65)	0.160
Neutral	3 (11.5)	8 (30.8)	15 (57.7)		2 (7.7)	5 (19.2)	19 (73.1)	
Agree	17 (2.6)	43 (6.5)	605 (91.0)		17 (8)	18 (8.5)	178 (83.6)	

12

Is Virtual Care Here to Stay? The Impact of Virtual Care on Healthcare Resource Utilization During the Pandemic in Comparison to the Pre-Pandemic Period

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Objectives: The COVID-19 pandemic has accelerated the adoption of virtual care. Our aim was to explore the impact of virtual rheumatology care during the pandemic on healthcare resource utilization, by comparing to the pre-pandemic period.

Methods: Patients who had at least one phone visit during the early pandemic and enrolled to a previous survey study were invited to attend to this follow up study.[1] Through patient surveys and review of medical charts, number of Emergency room (ER) and walk-in clinic visits and hospital admissions due to any cause and their rheumatological disease; and patients' need for additional palliative treatments for pain control were collected, for pre-COVID-19 (Jan 2019-Mar 2020) and pandemic period (Mar 2020 – June 2021). In addition, the rate of "failed virtual visit" was identified, by exploring patients that were brought to clinic for an in-person visit due to the virtual visit being insufficient as well as impact of the failed visits.

Results: During the study period, there were 759 phones, 41 zoom and 115

	Patients with failed visit (N:23) n (%)	Patients without failed visit (N:253) n (%)	P
Age *mean (SD)*	66.6 (9.4)	65.6 (12.6)	0.694
Gender Female	19 (82.6)	180 (71.1)	0.241
Virtual visit type			
Only phone	20 (87.3)	233 (92.5)	0.410
Doctor spoken to only resident			
Only resident	3 (13)	35 (14.2)	1.00
Capability using a telephone			
Very capable	18 (78.3)	199 (79.3)	0.991
Somewhat capable	4 (17.4)	41 (16.3)	
Very limited capability	1 (4.3)	11 (4.4)	
Overall Satisfied			
Agree	18 (81.8)	198 (80.8)	0.181
Neutral	4 (18.2)	24 (9.8)	
Disagree	0	23 (9.4)	
Prefer virtual visit even after the COVID-19 pandemic			
Agree	13 (59.1)	135 (55.1)	
Neutral	3 (13.6)	36 (14.7)	0.936
Disagree	6 (27.3)	74 (30.2)	
Health care utilization			
Total number of rheumatology outpatient visits *median (IQR)*	5 (3)	3 (2)	**<0.001**
ER visits due to any cause	7 (31.8)	73 (29.1)	0.787
Walk-in clinic visits due to any cause	3 (13.0)	48 (19.0)	0.587
Hospital admissions due to any cause	8 (34.8)	49 (19.5)	0.105
ER visits due to underlying rheumatological disease	0	11 (4.7)	0.606
Walk-in clinic visits due to underlying rheumatological disease	0	13 (5.3)	0.608
Hospital admissions due to underlying rheumatological disease	1(4.4)	11 (4.4)	1.00
Increased medications for pain relief due to underlying rheumatological disease*	15 (65.2)	66 (26.1)	**<0.001**
Steroid	11 (47.8)	37 (14.6)	**<0.001**
Modification in csDMARD therapies	7 (30.4)	30 (11.9)	**0.021**
Modification in advanced therapies	3 (13.0)	20 (7.9)	0.421

SD: Standard Deviation, ER: Emergency Room, csDMARD: Conventional synthetic disease-modifying antirheumatic drugs, IQR: Interquartile range

The comparison of patients' demographic, healthcare utilization and characteristics of virtual visits between patients with failed and without failed visits during COVID-19 period.

in-person visits for 276 patients. While the total number of rheumatology visits (median (IQR) 2 (1) vs 3 (2), $P < 0.001$), ER visits (19% vs 29.3%, $P = 0.006$) and hospital admissions (12.9% vs 20.8%, $P = 0.015$) due to any cause were increased during the pandemic, there was no increased ER visit or admissions due to their rheumatological disease. Around 1/3 of patients reported being on more pain medication during the COVID-19 period. Failed virtual visits were observed in 23 (3.1%) of 800 virtual visits which included 23 (8.3%) of the 276 patients, leading to an additional 25 in-person visits after a median (IQR) of 12 (25) days. Close to fifty percent of the patients with failed virtual visits were treated with additional steroid therapy during the pandemic. Patients with failed virtual visits needed a higher number of rheumatology visits in general and had more frequent modifications of their csDMARD therapies, compared to patients without failed virtual visits (Table).

Conclusion: Overall the rate of failed virtual visits was very low (3.1% of all virtual visits). However, these patients were more frequently treated with steroids, which might have been implemented to manage the patients until seen in the clinic. Although virtual care was generally found to be efficient in our context, patients with failed virtual visits may need an accommodation to be seen in-person quickly to avoid bridging steroid therapy. References: [1.] Goldhar HA. Clin Rheumatol 2022;41(9):2839-44.

13

Metabolic Syndrome and Knee Osteoarthritis Study

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Objectives: The objective of this study is to identify the frequency of Metabolic Syndrome (MetS) and its components in knee osteoarthritis (KOA) patients who have undergone knee replacement surgeries. KOA is a leading cause of morbidity and disability. It is often bilateral and estimated to affect one-fifth of individuals over the age of sixty-five. MetS is a cluster of conditions (obesity, hypertension, diabetes, and dyslipidemia) that increases risk for cardiovascular diseases. Obesity is a well-established risk factor for KOA, and increasing evidence has demonstrated systemic effects of obesity in OA outside of its mechanical impact on weight-bearing joints.[1] This led to studies showing the epidemiological relationship between MetS and OA.[2,3] Understanding the association between MetS, its components and KOA may provide insights on improved management for people with osteoarthritis.

Methods: A retrospective chart review is performed of patients who have undergone knee joint arthroplasty from January 2021 to December 2021 in the hospitals of Saskatoon. Demographics (age, sex, urban/rural residence, smoking status, employment) were recorded. MetS was defined as the presence of three or more of the following: obesity (BMI of ≥ 30), hypertension, diabetes, and dyslipidemia. Comorbidities were calculated using the Charlson Comorbidity Index. Inclusion criteria includes patients eighteen years and older who have received knee joint replacement surgery with primary osteoarthritis. Patients with secondary osteoarthritis were excluded. Descriptive statistics was utilized to characterize KOA population.

Results: Of those KOA individuals who underwent knee joint surgery (n = 101), 39.6% (n = 40) have MetS while 60.4% (n = 61) do not have MetS. Moreover, 17.8% (n = 18) are classified by BMI as overweight, 76.2% (n = 77) are obese, 64.4% (n = 65) have hypertension, 25.7% (n = 26) have diabetes and 48.5% (n = 49) have dyslipidemia. When KOA patients were categorized by age, 22.2% (n = 4) of 50-59 years, 35.0% (n = 14) of 60-69 years, 54.1% (n = 20) of 70-79 years, and 40.0% (n = 2) of ≥ 80 years have MetS. Overall, 40.5% (n = 17) and 39.0% (n = 23) of males and females, respectively, have MetS. By residence, 44.6% (n = 25) of patients living in urban areas and 33.3% (n = 15) of patient living in rural areas have MetS.

Conclusion: This study revealed 39.6% of KOA patients who have undergone knee joint surgery have MetS. Strikingly, 76.2% of KOA patients are obese and 64.4% have hypertension. The association of MetS and its components (such as obesity and hypertension) with KOA raises questions about the interplay between these conditions, and further research is needed to clarify this relationship. References: [1.] Yusuf E. Ann Rheum Dis 2010;69:761-765. [2.] Yoshimura N. Osteoarthritis Cartilage 2012;20:1217-1226. [3.] Puenpatom RA. Postgrad Med 2009;121:9-20.

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Inequities in Arthritis Care in Canada: The Black, Indigenous and Person of Color (BIPOC) Experience

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Objectives: Research shows that inequities continue to pervade health care (HC) in systemic ways. The objective of this community-led, crowdsourced Survey was to identify observable disparities in access to and benefit from HC services between White and Black, Indigenous and Person of Color (BIPOC) respondents.

Methods: Arthritis Consumer Experts conducted a 33-question online Survey (Aug 2-19, 2022) in English and French. The Survey was conducted in partnership with Research Co., a public polling firm. Respondents answered questions regarding sociodemographic information, access to HC, interactions with HC providers and information seeking habits. Data were analyzed

Table 1: Sociodemographic Information (Modified PROGRESS-Plus Framework)

Place of residence*	
Large urban centre (population of 100,000+)	676 (54%)
Small-medium sized population centre (population of 16,000 to 99,999)	282 (23%)
Rural or remote community (population of 15,999 or less)	180 (14%)
Ethnic origin*	
European	772 (62%)
Latin American	49 (4%)
South Asian	55 (4%)
East Asian	71 (6%)
Southeast Asian	38 (3%)
Middle Eastern	32 (3%)
Other	153 (12%)
Ethnic group*	
White	932 (75%)
Black, Indigenous and Person of Colour TOTAL	317 (25%)
Black	86 (7%)
Indigenous	115 (9%)
Gender*	
Woman	732 (59%)
Man	484 (39%)
Non-binary	16 (1%)
I prefer not to answer	11 (1%)
I prefer to describe myself as (please use the box to type your answer)	6 (<1%)
Two-spirited	
Two-spirited	55 (49% of Indigenous respondents)
Education*	
Less than high school	47 (4%)
High school or equivalent	227 (18%)
Some college or university	292 (23%)
College or university graduate	572 (46%)
Socioeconomic status (Annual income)*	
$0.00-$19,999	112 (9%)
$20,000-$39,999	227 (18%)
$40,000-$59,999	195 (16%)
$60,000-$79,999	169 (14%)
$80,000-$99,999	120 (10%)
$100,000-$149,999	157 (13%)
$150,000 and over	87 (7%)
I prefer not to answer this question	71 (6%)
Social capital (Access to care)*	
Yes	893 (72%)
No	159 (13%)
In search of one	84 (7%)
Not in search of one	18 (1%)
I use an online platform	20 (2%)
Walk-in clinics	49 (4%)
Other	33 (3%)
Plus (Type of arthritis)*	
Adult-onset Still's disease	24 (2%)
Ankylosing spondylitis	178 (14%)
Fibromyalgia	54 (4%)
Gout	35 (3%)
Juvenile idiopathic arthritis	19 (2%)
Lupus	18 (1%)
Non-radiographic axial spondyloarthritis (not visible on X-ray)	25 (2%)
Osteoarthritis	230 (18%)
Polymyalgia rheumatica	10 (1%)
Psoriatic arthritis	57 (5%)
Rheumatoid arthritis	182 (15%)
Scleroderma	2 (<1%)
Sjögrens syndrome	17 (1%)
Vasculitis	9 (1%)
Do not know	328 (26%)
Other	61 (5%)

*Percentages do not add to 100% due to missing values and/or round off.

in subgroups (ie, BIPOC vs White, women vs men, rural vs non-rural) and aggregate (including incomplete survey responses). Chi-square tests (exact tests where possible) were used to test for associations.

Results: A total of 1249 responses were received from 317 (25%) BIPOC and 932 (75%) White respondents with self-reported arthritis. 732 (59%) respondents identified as women, 484 (39%) men, 16 (1%) non-binary. 676 (54%) lived in urban areas; 462 (37%) in suburban or rural areas (Table 1). Compared to White respondents, BIPOC reported greater barriers to accessing care including time (40%), travel (31%), previous unpleasant experiences (21%), language (20%), and competing priorities (19%). When Indigenous Peoples were asked if their health-care provider included traditional medicines or practices, 51% responded "yes" and 49% "no". Overall, interactions with HC providers were rated less favorably by BIPOC respondents. When asked which characteristics they looked for in HC providers, significant differences were revealed. BIPOC respondents were six times as likely to report having experienced ethnicity-based discrimination "often" (13%), when compared to White respondents (2%). Results were even more pronounced for Indigenous Peoples who face discrimination "often" based on ethnicity (25% vs 2%), gender (21% vs 5%), and sexual orientation (15% vs 2%). Black (55%), Indigenous (54%) and POC (43%) respondents were more likely to find online information to be "helpful" and all preferred resources recommended by family and close friends with culturally sensitive content. In contrast to White respondents (66%), less BIPOC (51%) viewed official public health websites as trustworthy. BIPOC respondents more often turn to family, friends, coworkers, traditional healers, and elders for health information.

Conclusion: Our findings suggest that BIPOC respondents face significantly greater barriers when accessing arthritis care, and when they do, benefit less from their interactions. The data further reinforce literature that calls for culturally safe spaces which meaningfully address patient concerns and action equitable care.

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A Case of Clinical Overlap Between Eosinophilic Granulomatosis With Polyangiitis and Anti-Glomerular Basement Membrane Disease

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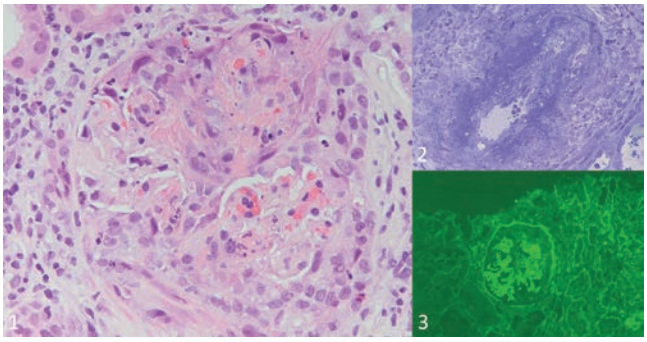
Background: Overlap between anti-glomerular basement membrane (anti-GBM) disease and anti-neutrophil cytoplasmic antibody associated vasculitis is well documented.[1] These patients are typically anti-PR3 antibody positive and follow a granulomatosis with polyangiitis phenotype. Overlap of eosinophilic granulomatosis with polyangiitis (EGPA) and anti-GBM has only rarely been described.[2,3] We report a such case here.

Case: A 59-year-old man presented with months of worsening nasal congestion, headache, and constitutional symptoms. His medical history included allergic rhinitis, dyslipidemia, hypertension, and type II diabetes. His medications included atorvastatin, irbesartan, esomeprazole, and fluticasone nasal spray. On physical examination he was afebrile with normal vital signs. There was new bilateral pitting edema in the lower extremities. Respiratory, cardiac, and abdominal examinations were unremarkable. Initial laboratory testing showed elevated creatinine (700 mmol/L), normocytic anemia (74 g/L), leukocytosis (11.6 × 10^9/L) with eosinophilia (3.1 × 10^9/L, with normal < 0.5 × 10^9/L), and thrombocytosis (574 × 10^9/L). Inflammatory markers were elevated with CRP 157 mg/L (with normal < 7.99 mg/L) and ESR 130 mm/Hr (with normal < 26 mm/hr). Urinalysis showed blood (200 ery/mL) and protein (1.0 g/L). Urine microscopy revealed red blood cells, leukocytes, and granular casts. CT scanning revealed focal interstitial lung changes in the right lower lobe, bilateral renal enlargement, and perinephric stranding.

The worsening nasal congestion, eosinophilia, and active urine sediment raised the question of EGPA with glomerulonephritis. Serology revealed positive anti-MPO (> 8.0 AI, with normal < 0.2 AI), negative anti-PR3, and positive anti-GBM (2.0 AI, with normal < 0.2 AI). Empiric immunosuppression with pulse corticosteroids was initiated along with transfer to a tertiary care center. Renal biopsy demonstrated segmental to global hypercellularity, necrosis, occasional sclerosis, and several cellular crescents in the glomeruli (Figure 1, panel 1); an artery with fibrinoid necrosis (Figure 1, panel 2); 1+ peripheral linear IgG kappa and lambda on immunofluorescence (Figure 1, panel 3); and no electron dense deposits on electron microscopy. Overlap between anti-GBM disease and EGPA with renal involvement was diagnosed. The patient was treated with plasma exchange (PLEX), cyclophosphamide, and high dose corticosteroids. The anti-GBM titer was 0.5 AI after seven cycles of PLEX, therefore it was discontinued. His creatinine improved to 323 mmol/L and he was discharged home on cyclophosphamide and tapering prednisone with continued renal recovery post-discharge.

Conclusion: This case demonstrates overlap between EGPA and anti-GBM disease and is one of few reported in the literature thus far. Evidence for overlap with anti-GBM disease was based on both serology and immunofluorescence pattern on renal biopsy. References: [1.] McAdoo SP. Kidney



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Toll-like Receptor Stimulation of B Lymphocytes From Lupus-Prone Mice Induces Production of Anti-LG3 of Importance in the Development of Lupus Nephritis

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Objectives: Lupus Nephritis (LN) is a common and serious manifestation of systemic lupus erythematosus (SLE). Biomarkers of progressive renal dysfunction in LN are lacking. We have shown that vascular injury derived apoptotic exosomes can trigger SLE autoantibodies as well as autoantibodies targeting perlecan/LG3 (anti-LG3). Our group have also unraveled biomarkers and effector roles of anti-LG3 in kidney vascular damage in both native and transplanted kidneys. We hypothesize that the pro-inflammatory conditions prevalent in SLE patients, such as increased TLR activation, stimulate the production of anti-LG3 of importance in the development of LN. Our first objective was to evaluate the level of circulating anti-LG3 antibodies during the development of LN in SLE prone mice. Our second objective was to characterize the importance of TLR in triggering LG3-specific B cells autoantibody production.

Methods: Longitudinal bleeds were performed on SLE prone NZB/NZWF1 mice and control mice (WT) and circulating anti-LG3 IgG as well as anti-LG3 IgM levels were measured by ELISA. B cells from NZB/NZWF1 or WT female mouse spleens and peritoneal cavity were isolated at different stages of disease (12, 24, 36 and 40 weeks) and characterized. Following in vitro stimulation with pro-inflammatory Toll-Like-Receptor (TLR) agonists, anti-LG3 IgG and IgM levels were assessed in the culture supernatants by ELISA.

Results: Elevated anti-LG3 levels are found in NZB/NZWF1 mice compared to WT mice. Exploring the functional importance of TLRs in triggering such a response, we show that exposure of B cells from 24 weeks old WT and NZB/NZWF1 mice to different TLR agonists triggered anti-LG3 IgM production (TLR1/2 $P < 0.0001$, TLR4 $P = 0.003$, TLR7 and TLR9 $P = 0.008$). B cells isolated from young 12 weeks old NZB/NZWF1 mice also secreted detectable levels of anti-LG3 IgG antibodies when stimulated with TLR9 ($P = 0.009$), TLR4 ($P = 0.005$) and TLR1/2 ($P = 0.0005$) agonists, while B cells isolated from control mice did not. Interestingly while TLR agonists known to contribute to SLE pathogenesis triggered significantly higher IgM anti-LG3 production than in controls stimulation of TLR are not associated to SLE pathogenesis (TLR3 and TLR5) did not.

Conclusion: These observations suggest that LG3-specific B cells may be modulated under pro-inflammatory conditions such as those prevalent in lupus patients, leading to production of autoantibodies. A better understanding of the impact of these mechanisms will lead to improved identification, prediction and management of NL.

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New Canadian Data on Vitamin D Status in ANCA-Associated Vasculitis: Baseline Data From an Ongoing Pragmatic Study

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Objectives: There is a paucity of data correlating Vitamin D status to ANCA-associated vasculitis (AAV). Whether optimization of Vitamin D status impacts AAV disease manifestations/activity is unknown. In an ongoing exploratory, pragmatic study, the 25-hydroxyvitamin D levels [25(OH)D] were measured in a cohort of patients with AAV and association of disease activity was investigated accordingly.

Methods: The study aimed to enroll >100 patients with AAV at the Mount Sinai Hospital Vasculitis Clinic, in Toronto, Ontario from January to July 2021 and over < 6 months. 25(OH)D was measured at the baseline visit and deficient/insufficient levels were defined as 25(OH)D < 75 nmol/L. Participants with deficient 25(OH)D were asked to increase Vitamin D supplementation by 1000 (to a maximum of 2000 IU/day). The endpoint is relapse at 12 months. Clinical and serological disease characteristics at diagnosis and enrollment, in addition to medications, were collected and reported here.

Results: Due to the COVID-19 pandemic, enrollment lasted longer than planned (January to December 2021); with a total of 103 patients enrolled with consent. One patient was excluded due to a history of hyperparathyroidism. Mean age of the remaining 102 patients at time of AAV diagnosis vs study enrollment was 47.6 ± 20 years, and 54.7 ± 20 years, respectively; 59 were female; and 50 had granulomatosis with polyangiitis, 52 had microscopic polyangiitis or eosinophilic granulomatosis with polyangiitis (Table 1). A history of positive ANCA status was seen in a majority of patients (n = 87/102 [85.3%]); and disease manifestations included lung (n = 79), renal (n = 63), and gastrointestinal (n = 17). At enrollment, 89 patients were in remission; 52 were on prednisone, and 45 on rituximab. Thirty-nine (38.2%) patients had insufficient/deficient 25(OH)D levels and were more likely to be younger in age at time of measurement (49.6 ± 17 years, vs 58.1 ± 18 years with sufficient levels; $P = 0.019$). No other outcome measure was found to have a significant difference between sufficient vs insufficient/deficient 25(OH)D levels. There was also no difference in the mean 25(OH)D level based on period of enrollment (April to September vs October to March).

Conclusion: Similar to a previous North American retrospective study from the VCRC, just over one-third of patients with AAV enrolled in this prospective pragmatic study had insufficient/deficient vitamin D levels. Younger age was the only association with insufficient/deficient vitamin D levels. Ongoing follow-up of these patients will provide additional data on the impact of vitamin D status and its optimization with supplementation on AAV disease activity/relapse.

Table 1. Clinical manifestations and main laboratory results for 102 patients with ANCA-associated vasculitis.

	Total n=102	Patients with sufficient 25(OH)D > 75 nmol/L n=63	Patients with insufficient 25(OH)D <75nmol/L n=39	P Value
Female, n (%)	59 (57.8)	28 (44.4)	21 (55.3)	0.36
Age				
Mean age at diagnosis, years±SD	47.6±20	50.0±21	43.7±19	0.13
Mean age at enrollment, years±SD	54.7±20	58.1±18	49.6±17	0.019
Ethnicity, n (%)				0.87
White	66(64.7)	43 (68.2)	23 (59.0)	
Asian	3(2.9)	2 (3.2)	1(2.6)	
Black	3 (2.9)	2 (3.2)	1(2.6)	
East Indian	13 (12.7)	6 (9.5)	7(17.9)	
Middle Eastern	11 (10.8)	7 (11)	4 (10.3)	
Pacific	2 (2.0)	1(1.6)	1 (2.6)	
Smoking History, n (%)				0.31
Ex-smoker	18(17.6)	13 (20.6)	5 (12.8)	
Current Smoker	2 (2.0)	0(0.0)	2 (5.1)	
Forms of Vasculitis, n (%)				0.98
GPA	50 (49.0)	31 (49.2)	19 (48.7)	
EGPA	24 (23.7)	15(23.8)	9 (23.7)	
MPA	28 (27.7)	17(27.0)	11 (28.9)	
Positive ANCA, n (%)	87 (85.3)	56 (88.9)	31 (79.5)	0.19
Treatments at enrollment, n (%)				0.38
Prednisone	52 (51.0)	29 (46.0)	23 (59.0)	
Rituximab	45 (44.1)	29 (46.0)	16 (41.0)	
Manifestations (ever), n (%)				
Lung (includes asthma)	79 (77.4)	50 (79.4)	29 (74.4)	0.56
Renal	63 (61.8)	38 (60.3)	25 (64.1)	0.70
Gastrointestinal	17 (16.7)	13 (20.6)	4 (10.3)	0.17
Laboratory				
Hemoglobin, g/dL±SD	133±17	132±18	136±17	0.27
White blood cells, 10^9/L±SD	7.9±3	7.6±3	8.5±3	0.14
Platelets, 10^9/L±SD	262±84	261±94	268±65	0.68
C-reactive protein, mg/L±SD	4.7±97	5.1±11	4.0±8	0.59
Creatinine, µmol/L±SD	121±131	130±159	105±67	0.35
25-Hydroxyvitamin D (25[OH]D) level (mean, nmol/L±SD)				
All	89.8±44	117±37	51.7±15	0.10
(April - September)	95.0±40	115±32	53.7±13	0.79
(October - March)	85.6±47	118±42	51.8±18	
Disease Status at Enrollment, n (%)				
Remission at time of Enrollment	89 (87.2)	57 (90.5)	32 (82.0)	0.21
Active disease at time of Enrollment	13 (12.7)	6 (11.1)	7 (17.9)	

GPA: granulomatosis with polyangiitis; MPA: microscopic polyangiitis; EGPA: eosinophilic granulomatosis with polyangiitis; SD: standard deviation

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Responsiveness of the Patient-Reported Outcomes Measurement Information System (PROMIS) Computerized Adaptive Test (CAT) Measures in a Single Canadian Lupus Cohort

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Objectives: Patient-Reported Outcome (PRO) measures should be included in the assessment of lupus patients as they are crucial in providing patient-centered care. The Patient-Reported Outcomes Measurement Information System (PROMIS) is a relatively new set of person-centered measures that describes and evaluates physical, mental, and social health. Our previous studies have demonstrated reliability and validity evidence for PROMIS CAT in systemic lupus erythematosus (SLE). This study extends this evidence by examining its responsiveness. We hypothesized that PROMIS CAT domains will show a change when the patient reports worsening or improvement.

Methods: In this longitudinal study, consecutive adult English-speaking SLE patients were invited to participate. Patients completed an assessment using PROMIS CAT's 13 domains (physical function, mobility, pain behavior, pain interference, ability to participate in social roles, satisfaction with social roles and activities, fatigue, sleep disturbance, sleep-related impairment, applied cognition-general concerns, anger, anxiety, and depression) and corresponding legacy instruments at baseline and at 3 and 6 months. The generic anchor question "Compared to when you started the study, how have you been during the last 48 hours? (responses: same, worse, no change)" was asked to identify those with symptom severity change. Domain-specific anchor questions were asked at 6 months with responses graded from -7 (greatest worsening) to +7 (greatest improvement), and 0 representing no change. For domain-specific anchors, improvement was defined as > 1, and worsening as < -1. We assessed responsiveness by examining effect size (ES) and standardized response means (SRM) in patients with improvement and worsening, with higher values reflecting greater sensitivity to change.

Table 1. Results of Responsiveness at 6 Months

External Anchor Measures for Each PROMIS CAT Domain	Correlation of Δ External Anchor With Δ PROMIS			Standardized Response Mean			Effect Size		
	Better (n=22)	Same (n=67)	Worse (n=19)	Better	Same	Worse	Better	Same	Worse
Physical Function									
General	0.24	0.07	0.48*	0.19	-0.17	-0.65*	0.09	-0.06	-0.44
Domain-Specific	0.05	0.03	0.41*	0.17	-0.14	-0.60*	0.06	-0.06	-0.38
Pain Interference									
General	0.25	0.15	0.46*	-0.34	-0.10	0.45	-0.31	-0.06	0.40
Domain-Specific	0.20	0.04	0.00	-0.39	-0.14	0.66*	-0.40	-0.08	0.52*
Pain Behaviour									
General	0.19	0.19	0.08	-0.15	0.01	0.43	-0.14	0.01	0.40
Domain-Specific	0.16	0.09	0.39*	-0.19	0.04	0.58*	-0.23	0.03	0.44
Ability to Participate in Social Roles & Activities									
General	0.09	0.03	0.32*	0.69*	0.25	-0.28	0.73*	0.18	-0.20
Domain-Specific	0.42*	0.04	0.52*	0.64*	0.26	-0.05	0.48	0.18	-0.07
Satisfaction with Social Roles & Activities									
General	0.39*	0.01	0.36*	0.01	0.09	-0.48	0.00	0.07	-0.34
Domain-Specific	0.11	0.11	0.32	0.45	-0.04	-0.36	0.30	-0.03	-0.33
Fatigue									
General	0.28	0.29	0.64*	-0.22	0.08	0.27	-0.19	0.04	0.19
Domain-Specific	0.17	0.03	0.34*	-0.38	-0.15	0.74*	-0.28	-0.07	0.43
Sleep Disturbance									
General	0.47*	0.39*	0.71**	-0.33	-0.05	0.23	-0.29	-0.03	0.20
Domain-Specific	0.08	0.25	0.27	-0.73*	-0.15	0.77*	-0.68*	-0.08	0.46
Sleep-related Impairment									
General	0.32*	0.19	0.37*	-0.51*	-0.04	-0.02	-0.53*	-0.02	-0.02
Domain-Specific	0.07	0.14	0.10	-0.64*	-0.15	0.22	-0.98**	-0.08	0.16
Anger									
General	0.14	0.19	0.21	-0.25	-0.12	-0.06	-0.21	-0.09	-0.04
Domain-Specific	0.06	0.05	0.09	-0.37	-0.16	0.19	-0.39	-0.11	0.19
Anxiety									
General	0.06	0.03	0.00	-0.34	-0.10	0.25	-0.26	-0.08	0.18
Domain-Specific	0.33*	0.24	0.33*	-0.42	-0.12	0.50*	-0.39	-0.09	0.29
Depression									
General	0.19	0.39*	0.14	-0.43	0.04	0.16	-0.33	0.03	0.09
Domain-Specific	0.38*	0.24	0.24	-0.43	-0.05	0.62*	-0.48	-0.04	0.39
Mobility									
General	0.10	0.21	0.06	0.28	-0.06	-0.54*	0.12	-0.02	-0.36
Domain-Specific	0.54*	0.18	0.16	0.29	-0.10	-0.56*	0.17	-0.04	-0.45
Cognitive function-abilities									
General	0.38*	0.09	0.48*	0.44	0.11	-0.32	0.37	0.08	-0.32
Domain-Specific	0.04	0.01	0.05	-0.28	0.22	-0.31	-0.22	0.17	-0.28

Correlation: *moderate: 0.3-0.7, **strong: >0.7; |SRM/ES|: *moderate: 0.5-0.8, **high: >0.8

Results: 108 patients (90.7% female) were included with a mean age of 48.1 ± 13.5 years that had mean SLE duration of 18.9 ± 11.7 years at baseline. Table 1 demonstrates Spearman correlation coefficients, SRM and ES for both the general anchor and domain-specific anchors. The Spearman correlation of anchor measures with PROMIS CAT was weak-moderate. SRM and ES showed small-moderate effect for patients that reported better and worse health and showed small to no effect in those reporting no change, indicating PROMIS CAT is measuring the domains adequately as captured by the general anchor. Nine out of 13 domains had moderate SRMs and ES, particularly with domain-specific anchors.

Conclusion: PROMIS CAT detected improvement and worsening over time in most domains in patients with SLE in concordance with the external anchors, supporting its responsiveness in this population for most but not all types of change.

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Calciphylaxis Associated With Eosinophilic Fasciitis: A Case and Literature Review

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Background: Calciphylaxis is a rare form of panniculitis characterized by calcification of microvessels in the subcutaneous adipose tissue and dermis, leading to intensely painful ischemic skin lesions and a high mortality rate. Although typically diagnosed in patients with end-stage renal disease (ESRD), connective tissue diseases are a known cause of nonuremic calciphylaxis (NUC). We describe the first reported case of NUC in a patient with eosinophilic fasciitis and provide an updated review of the literature on NUC in rheumatologic conditions.

Case: A 61-year-old woman with no prior past medical history presented to care for progressive pain, nodularity, and skin tightening of her forearms and shins bilaterally. There was no involvement of the fingers or toes, and no associated Raynaud's phenomenon. Initial laboratory investigations revealed an elevated peripheral eosinophil count at 2.0 × 10^9/L (N < 0.5 × 10^9/L), with normal creatinine at 74 umol/L (N < 90 umol/L) and calcium at 2.28 mmol/L (N < 2.52 mmol/L). She also had a normal TSH, A1C, ANA, RF, and SPEP. She underwent a full thickness skin and muscle biopsy of the right medial calf which revealed features consistent with eosinophilic fasciitis along with mural calcification of subcutaneous capillaries and a few small non-necrotizing granulomas within the dermis. These findings were reviewed at combined Rheumatology-Pathology rounds, confirming eosinophilic fasciitis with calciphylaxis. No fungi or mycobacteria were identified on PASD and Ziehl-Neelsen stains. She also had a thorough infectious granulomatous workup including syphilis, HIV, viral hepatitis, bartonella, coxiella, lyme, TB skin test, coccidioides, and histoplasma which all returned negative. She had a negative CT chest, abdomen, and pelvis, normal age-appropriate malignancy screening, and a mildly elevated serum ACE level at 58 IU/L (N < 52). Calciphylaxis workup revealed no other potential causes; serum creatinine, A1C, calcium, and PTH remained within normal limits. She was initiated on methotrexate

25 mg weekly and prednisone 50 mg on a tapering course. Her skin symptoms have improved along with normalization of peripheral eosinophilia and no progression of her calciphylaxis thus far.

Conclusion: Nonuremic calciphylaxis (NUC) is a rare but highly morbid consequence of rheumatologic disease. Although several cases of NUC secondary to SLE, rheumatoid arthritis, and giant cell arteritis are documented in the literature, we describe the first reported case in a patient with eosinophilic fasciitis. Further work is needed to elucidate the mechanistic underpinnings linking NUC and connective tissue disease and establish efficacious therapies.

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Disease Characteristics, Disability, and Quality of Life in Adult HPP Patients With Muscular Symptoms and Pain Without Skeletal Manifestations – A Cross-Sectional Analysis from the Global HPP Registry

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Objectives: Hypophosphatasia (HPP) is a rare, inherited metabolic disease caused by deficient activity of tissue-non-specific alkaline phosphatase (TNSALP). We aimed to compare disease burden in adults with HPP presenting with skeletal manifestations vs those presenting with only non-skeletal manifestations.

Methods: Baseline/pretreatment data from the Global HPP Registry were analyzed to compare adults (≥ 18 years of age) with skeletal manifestations (history of rickets, biopsy-proven osteomalacia, recurrent or poorly healing fractures/pseudofractures [Skeletal group]) and those with only non-skeletal manifestations (history of muscle weakness, fatigue, and/or pain [Non-skeletal group]).

Results: Among 468 adults with HPP, 300 had skeletal manifestations and 73 had only non-skeletal manifestations (Table). The median number of body systems involved at baseline was higher in the Skeletal group than in the Non-skeletal group. Median 6-Minute Walk Test distance was similar between groups, although data were limited. Pain severity (Brief Pain Inventory-Short Form [BPI-SF]), disability (Health Assessment Questionnaire-Disability Index [HAQ-DI]), and quality of life (Medical Outcomes Study Short Form-36 Health Survey [SF-36] Mental Component Summary Score) were also similar between groups. Both groups had median SF-36 Mental and Physical Component Summary Scores less than 50.

	Skeletal (n=300)	Non-skeletal (n=73)
Age at baseline, years		
n	300	73
Median (min, max)	50.1 (18.3, 81.2)	44.4 (19.3, 72.8)
HPP onset, n (%)		
Patients with data reported	299	72
Perinatal/infantile-onset	10 (3.3)	2 (2.8)
Juvenile-onset	126 (42.1)	16 (22.2)
Pediatric-onset, specific type unknown	29 (9.7)	6 (8.3)
Adult-onset	95 (31.8)	34 (47.2)
Unknown	39 (13.0)	14 (19.4)
Number of body systems impacted per patient		
n	282	73
Median (min, max)	3 (1, 8)	2 (1, 5)
6-Minute Walk Test, distance walked, meters		
n	41	5
Median (min, max)	465 (180, 740)	466 (316, 580)
Pain severity (BPI-SF)[1]		
n	188	48
Median (min, max)	3.8 (0.0, 10.0)	3.6 (0.0, 9.5)
Disability (HAQ-DI)[2]		
n	191	48
Median (min, max)	0.4 (0.0, 2.7)	0.3 (0.0, 2.1)
SF-36 Physical Component Summary Score[3]		
n	191	47
Median (min, max)	40.1 (16.5, 64.7)	44.2 (17.9, 62.0)
SF-36 Mental Component Summary Score[3]		
n	191	47
Median (min, max)	42.4 (13.2, 62.3)	43.9 (20.4, 61.9)

Scales: [1]0-10, lower is less pain; [2]0-3, lower is less disability; [3]0-100, lower is more disability.

Conclusion: The impairment associated with pain, disability, and general quality of life in patients with HPP who had muscular/pain manifestations without overt bone disease was generally similar to that in adults who had any skeletal manifestations. Further analyses are required to understand the disease characteristics of these patients.

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Immunogenicity and Efficacy of Mixed COVID-19 Vaccine Regimens in Immune-Mediated Inflammatory Diseases

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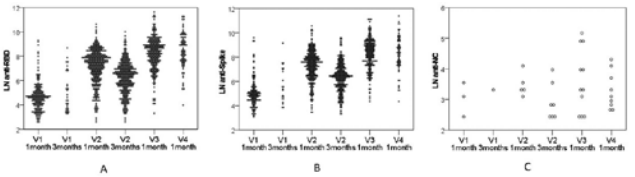
Objectives: Comparative data on immunogenicity of COVID-19 vaccination strategies are limited for people with immune-mediated inflammatory diseases (IMIDs). Among persons with IMIDs who received homologous or heterologous SARS-CoV-2 vaccines, we compared post-COVID-19 vaccine antibody responses.

Methods: From 02/2021-07/2022 persons with any of inflammatory arthritis (n = 66; 77% rheumatoid arthritis), systemic autoimmune rheumatic diseases (n = 82; 63% lupus), inflammatory bowel disease (n = 89; 43% Crohn's), and multiple sclerosis (n = 72; 77% relapsing remitting) self-reported COVID-19 illness and exposure risks, and had anti-spike, -receptor binding domain (RBD) and -nucleocapsid (NC) IgG antibodies tested by multiplex immunoassays following each vaccination (V1, V2, V3, V4). Anti-SARS-CoV-2 responses were compared across vaccine regimens and to responses in 370 age-sex matched vaccinated blood donor controls. Variables associated with seroconversion 1 month post V2 were tested using binary logistic regression models that included age, sex, diagnosis, vaccine interval (< or > 28 days), and IMID treatment.

Results: IMID participants were predominantly female (79%), White (95%), with a mean (standard deviation) age of 56.3 (14.2) years and a median (range) of 2 (0-9) comorbidities; 23% were taking immunosuppressants, 28% biologics, and 27% other immunomodulators. For their primary vaccination course (V1 and V2), most participants (66.2%) received homologous mRNA (BNT162b2 or mRNA1273) vaccines, 1.9% received homologous ChAdOx1, and 31.9% received heterologous vaccines (24.2% ChAdOx1/mRNA, 5.6% heterologous mRNA). Seroconversion rates increased post V2 (post-V1 anti-spike 52%, anti-RBD 59%; post-V2 anti-spike 90%; anti-RBD 92%), but remained lower than controls (V2 anti-Spike 98.1% $P < 0.0001$). Antibody titers waned by 3 months, but increased post-V3 (95% seroconverted) and post-V4 (96% seroconverted) (Figure). If primed with a vector vaccine, providing a mRNA vaccine as the second vaccine increased antibody titers to those comparable to homologous mRNA vaccines. Participants over age 65 years, with MS, taking biologics, or having early vaccination (< 22 days between V1 and V2) were less likely to seroconvert (postV2) in multivariate models. Most IMIDs who did not seroconvert were taking immunosuppressives (mycophenolate n = 8; methotrexate n = 2, azathioprine n = 2) or biologics (B cell targeting current/



Post COVID-19 vaccine anti-SARSCoV2 IgG levels in Immune Mediated Inflammatory Disease

A anti-RBD; B anti-Spike; C anti-NC

SARSCoV2= Severe acute respiratory syndrome coronavirus 2; RBD= receptor binding domain; NC= nucleocapsid;
Titers are LN= log transformed; MWU=Mann Whitney U test; WSR=Wilcoxon Signed Rank test
MWU Bonferroni adjusted group comparisons for anti-RBD and anti-Spike: V1 month vs V2 1 month p<0.0001; V2 1 month vs V2 3 months p<0.0001; V2 3 months vs V3 1mo p<0.0001; V2 1month vs V3 1 month p<0.0001; V3 1month vs V4 1 month p=NS; anti-NC across visits p=NS
WSR: Similar findings in paired analysis.

past n = 12, anti-TNF n = 4, other n = 1) n = 12, anti-TNF n = 4, other n = 1). Prior to Jan 2022, 1.6% reported confirmed COVID-19 by community-based polymerase chain reaction testing. Rates of new anti-NC seroconversion (COVID-19 infection) were stable over time [V1 n = 10/301 (1%), V2 n = 10/396 (2.5%), V3 n = 5/282 (1.8%) V4 n = 0/86 (0%)].

Conclusion: Heterologous COVID-19 vaccination improves seroconversion rates following a viral vector vaccine. Vaccines are effective in reducing COVID-19 infections (before Omicron). IMIDs need at least 3 vaccines.

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Delivery of Rheumatology Education to Internal Medicine Residents in Rwanda: Evaluation of a New Virtual Rheumatology Course

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Objectives: There exists a critical lack of rheumatology resources in many parts of the world, including sub-Saharan Africa. As a result, rheumatology education and training, by experienced trainers is limited. In an effort to improve rheumatology capacity in Africa, our organization "Rheumatology For All" (RFA), developed a rheumatology program for Internal Medicine (IM) Residents that can be delivered in-person or virtually. Here we describe the evolution, implementation and acceptance of the virtual educational program in Rwanda.

Methods: We delivered a virtual rheumatology course for approximately 30 second year IM residents in the University of Rwanda, Rwanda in 2021 and 2022. Weekly lectures and tutorials were delivered (in English) over 16 weeks by rheumatology faculty from Ghana, Ethiopia, South Africa, United States, United Kingdom and Canada. In 2021, prerecorded lectures were uploaded to a central website for students to review in preparation for weekly interactive online tutorials. In 2022, both lectures and interactive tutorials were "live". Additional teaching material, including customized videos demonstrating musculoskeletal exam techniques and reading material, was uploaded to a central website. We evaluated course experiences from 25 responding Rwandan students (13 in 2021; 12 in 2022).

Results: Feedback from 2021 was incorporated into the 2022 course when feasible. Only 8/25 (32%) were able to attend all lectures (2021 vs 2022, P = NS). All students found lectures and tutorials beneficial, especially physical examination videos. Half (52%) wanted more interaction with faculty (2021 vs 2022, P = NS). Some students reported difficulty accessing online content, though this improved in 2022 after switching to a university-based platform. Case-based discussions were considered important, and more clinical cases and student-led case presentations were requested. Culturally relevant images were appreciated. At the end of the course, students' confidence level with rheumatology cases was good with a median rating of 7/10 (range 5-9). While appreciative of the online course, many students requested bedside rheumatology training to allow more face-to face discussion, and hands-on demonstration of rheumatology skills. Student comment: "... we hope this will continue for the coming years and probably not only virtually but also [face-to-face] ... It would be good if we share cases ... (though we don't have all investigations) ..."

Conclusion: The RFA virtual rheumatology course is a feasible means to provide rheumatology education to African medical students. However, it does not replace the need for in-person or bedside teaching. This program will continue to evolve in response to regional needs.

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Biological Disease-Modifying Antirheumatic Drugs and Janus Kinase Inhibitors Treatment Survival in Rheumatoid Arthritis Patients in Canadian Clinic

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Objectives: Early treatment of rheumatoid arthritis (RA) include the use of biological disease-modifying antirheumatic drugs (bDMARDs) and Janus Kinase inhibitors (JAKi) to prevent progression or reverse damages caused by RA. However, these treatments are often switched for primary or secondary loss of effectiveness or side effects. Identifying risk factors of drug discontinuation can minimize delays in treatment and prevent permanent joint damage. The objective is then to compare bDMARDs and JAKi treatment duration, and identify risk factors associated with drug discontinuation.

Methods: This is a retrospective, single-center study (Mississauga, Ontario, Canada) conducted from Jan 2010-June 2022. Patients with RA, a clinic visit post Jan-01-2020, and treated with ≥ 1 bDMARD/JAKi in study period were included. Clinical information was collected from medical records. Patients treated with JAKi or bDMARDs for the first time are classified as bDMARD/JAKi naïve. Risk factors for drug discontinuation were assessed with Cox regression analysis. After eliminating multicollinearity, clinically and statistically significant variables were included in multivariable Cox regression analysis.

Results: 560 patients and 1170 bDMARDs/JAKi were included (100 [17.86%] male, median [IQR] age: 63.76 [17.12]). Etanercept and Upadacitinib had the longest (2705 [3815] days) and shortest duration (327 [307] days) respectively. Loss in efficacy was the primary reason for discontinuation for all bDMARDs/JAKi (78.63%). Treatment durations were compared between bDMARD/JAKi naïve status. Among bDMARD/JAKi naïve treatments, IL-6 inhibitors have the longest duration (median [IQR]: 3101 [2900] days). Overall, bDMARD/JAKi naïve treatments had significantly longer duration (1398 [2860] vs 581 [1064] days, $P < 0.001$). After stratifying for drug types, IL-6 inhibitors and TNF-α inhibitors continued to have significantly longer treatment durations in bDMARD naïve patients ($P < 0.001$). Table 1 outlines the Cox regression results.

Table 1 - Hazard ratios for risk factors on drug discontinuation

	Univariate Hazard ratios (95% CI)	Multivariate Hazard ratios (95% CI)
Male gender	0.95 (0.78-1.18)	1.04 (0.86-1.28)
Age at treatment start Age at treatment start ≥75 years old	1.01 (1.00-1.02) 1.41 (1.02-1.93)	- 1.29 (0.93-1.80)
Disease duration Disease duration, ≥5 years	1.00 (0.99-1.00) 0.64 (0.51-0.79)	- 0.68 (0.54-0.85)
Type of bDMARD/JAKi JAKi Anti-CD20 monoclonal antibodies IL-6 inhibitors TNF-alpha inhibitors T-cell inhibitors	 2.15 (1.67-2.76) 0.98 (0.52-1.83) 1.24 (1.01-1.52) Reference 1.94 (1.57-2.39)	 1.91 (1.47-2.50) 1.91 (0.96-3.78) 0.97 (0.77-1.21) Reference 1.48 (1.16-1.88)
bDMARD/JAKi naive	0.44 (0.38-0.52)	0.66 (0.55-0.80)
Concurrent csDMARDs	0.81 (0.64-1.02)	0.94 (0.77-1.15)
Prior/current corticosteroid use	1.67 (1.42-1.95)	1.08 (0.91-1.27)

- indicates not included in multivariate analysis
Others include: Felty's syndrome, palindromic arthritis, septic arthritis.
This table depicts performance of the risk factors to drug discontinuation. Cox regression was used to calculate hazard ratios with their 95% confidence intervals to identify predictors of drug survival. Variables that are statistically significant in univariable analysis, or clinically significant, were included in the multivariable analysis, after eliminating for multicollinearity.
Abbreviations: CI - confidence interval; bDMARD - biological disease-modifying antirheumatic drugs; JAKi - Janus Kinase inhibitor; IL-6 - interleukin 6; TNF - tumor necrosis factor; csDMARD - conventional synthetic disease-modifying antirheumatic drugs (csDMARDs).

Patients on JAKi, IL-6 or T-cell inhibitors when compared to TNF-alpha inhibitors were at greater risk of drug discontinuation. Patients who were < 75 years old, or biologic naïve were at a lower risk of drug discontinuation. When controlled for other risk factors, patients who were bDMARD/JAKi naïve (Hazard ratio [95% CI]: 0.66 [0.55-0.80]) remained at lower risk for drug discontinuation.

Conclusion: Patients on first-time bDMARD/JAKi treatment might be protected against drug discontinuation.

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Employment Trajectory of Canadian Young Adults With Systemic Lupus Erythematosus

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Objectives: Young adulthood, 18-30 years, is a time when many individuals start working. Failing to establish employment during young adulthood could predict lifetime financial hardships. Lack or limited employment could limit access to healthcare benefits, adversely affecting treatment access and health outcomes. Aim: To determine the average employment trajectory of childhood- and adult-onset systemic lupus erythematosus patients in young adulthood (YASLE).

Methods: Patients (with ≥ 2 visits) were from two longitudinal cohorts: the Canadian national lupus cohort (via the Canadian Network for Improved Outcomes in SLE, CaNIOS) and the University of Toronto (UT) lupus cohort from Toronto Western Hospital. The CaNIOS cohort (2002-2020) included participants from multiple provinces, the UT cohort only Ontario patients (1983-2020). Participants report employment states annually. The employment states were: employed, unemployed, homemaker, student, work disabled. This was reduced to: employed, unemployed or not in labor force (NLF, student, homemaker, work disabled) for modeling. The Markov multistate model (msm) was used to model employment trajectory. Transition probabilities at 1, 6, 12 years from age 18 years were calculated.

Results: 841 participants (85.4% females): 253 (CaNIOS) and 588 (UT). Mean age (standard deviation, SD) at baseline (cohort entry) was 23.1 (SD 3.7) years. Participants' age: 38.2% (18-20 years), 19.3% (21-23 years), 21.9% (24-26 years), 20.7% (27-30 years). 403 (47.9%) were cSLE. 89.5% completed high school. Median disease duration was 3.3 (0.7-6.6, 25th-75th percentile, P) years. Median follow-up was 2.8 (0.9- 6.5, 25th-75th P) years. At baseline, 16.6% were employed, 5.6% were unemployed and 77.8% were NLF (42 work disabled, 226 homemakers, 386 students). 374/6615 (6%) visits showed state changes. 58% occurred in the NLF group, 64% of changes were from students. YASLE patients have the highest probabilities of remaining in the same employment state as baseline (Table). With increasing age, there was a reduced rate of staying employed (0.69 to 0.64). Those unemployed showed low probability to become employed (0.28 to 0.38). The NLF group has static rate of transition to employment (0.65), without expected increase with age.

Table: Probability of Transitions in Unadjusted Markov Multistate Model by Age From 18 Years Old.

	Employed	Unemployed	Not in Labour Force*
	Age= 19 years, 1 year (from 18 years)		
Employed	0.69	0.14	0.17
Unemployed	0.28	0.61	0.10
Not in Labour Force	0.65	0.14	0.21
	Age=24 years, 6 years (from 18 years)		
Employed	0.67	0.17	0.17
Unemployed	0.33	0.55	0.11
Not in Labour Force	0.65	0.17	0.18
	Age=30 years, 12 years (from 18 years)		
Employed	0.65	0.19	0.17
Unemployed	0.38	0.49	0.12
Not in Labour Force	0.64	0.19	0.17

Conclusion: YASLE patients showed minimal or no increase in transitions into employment from non-employed states, and no increase in employment with age as expected in the general young adult population. This could suggest a lowered labor force attachment in YASLE patients, suggesting difficulties in establishing employment during young adulthood. Future work should focus on YASLE patients' perceived barriers and facilitators for employment, to target interventions for supporting patients' employment.

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An Advanced Physiotherapist Practitioner Model of Care as a Solution to Non-Urgent Referrals in Pediatric Rheumatology: Reflections From a Retrospective Chart Review

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Objectives: An Advanced Physiotherapist Practitioner (APP) working in pediatric rheumatology can assess musculoskeletal-focused referrals of any urgency, order and interpret investigations and provide management of these cases. In 2020, an APP role was created at McMaster Children's Hospital to support the growing caseload. In this study, we describe the characteristics and outcomes of patients assessed by the APP, and assess access to care for patients referred to pediatric rheumatology.

Methods: A retrospective chart review was performed on initial patient assessments performed by the APP in pediatric rheumatology between September 2020 and December 2021. Patients were initially triaged and deemed appropriate for the APP by a pediatric rheumatologist. Patients could be of any urgency where the primary objective was ruling out musculoskeletal inflammatory disease. Extracted data included demographic characteristics, triage category, diagnosis, wait times and interventions provided.

Results: Initial triage category (urgent, semi-urgent, non-urgent) was confirmed by a pediatric rheumatologist and 118 patients were assessed by the APP. Of these, 70% were female, 61% were 10-15 years old, and 50% were referred from primary care. The most common reason for referral was joint pain (87%). Of all referral symptoms, 9/19 were physiotherapy related (ie. joint clicking, hypermobility). The APP saw 17 (14%) urgent, 76 (65%) semi-urgent, 25 (21%) non-urgent cases. Almost all cases were seen within 180 days (98%), 71 (60%) were seen within 90 days and 29 (25%) were seen within 30 days. After assessment, 25 (21%) had a confirmed rheumatic disease and 93 (79%) were considered non-rheumatic and discharged. A physiotherapy diagnosis was provided in 76 (64%) cases and physiotherapy interventions were provided in 95 (80%) cases.

Conclusion: Most patients seen by the APP did not have a rheumatic disease and were managed with minimal involvement from a pediatric rheumatologist. More than half were seen within 90 days suggesting adequate access to care. The patient journey was shortened by providing immediate physiotherapy interventions. The base knowledge of a physiotherapist was an asset in this advanced practice role considering most non-rheumatic cases had a physiotherapy-related diagnosis. Future considerations should be given to establishing an APP dedicated clinic for non-urgent referrals to decrease pediatric rheumatologist input, optimize the skills of an APP, and improve access to care for patients.

26

One-Sixth of Canadian Newly Diagnosed RA Patients Treated in Routine Care Reported Sub-optimal Adherence to Early DMARD Strategies Associated With Poorer Disease Control at 12-Months Follow-Up: Results From the Canadian Early Arthritis Cohort Study

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Edward Keystone (University of Toronto, Toronto); Diane Tin (Southlake Regional Health Centre, Newmarket); Carter Thorne (The Arthritis Program Research Group, Newmarket); Vivian Bykerk (Hospital for Special Surgery, New York); Janet Pope (University of Western Ontario, London)

Objectives: To describe adherence to early DMARD strategies and associations with disease activity in "real-world" patients under routine care.

Methods: We analyzed baseline, 6- and 12-month data from the Canadian Early Arthritis Cohort (CATCH) study collected between 01-2017 and 03-2022 when a measure of medication adherence was added to the study protocol. CATCH is a prospective multi-center study of early RA patients (symptoms < 1 year; 81% fulfilling RA criteria at enrollment) diagnosed and treated in rheumatology clinics across Canada. Participants underwent detailed RA clinical assessments and completed sociodemographic and patient-reported outcome measures including the well-validated 4-item Morisky, Greene, Levine Medication Assessment Questionnaire (MGL-MAQ; range 0-low to 4-high adherence) referring to adherence to medications taken in the past month. The MGL-MAQ was also used to classify reasons for non-adherence as unintentional (ie, forgetting or carelessness with taking medication) and intentional (ie, stop taking medication when feeling good or when medication makes one feel bad). Level of adherence (High MGL-MAQ = 4 vs low/moderate < 4) and reasons for non-adherence to RA treatment at 6-months were summarized using descriptive statistics. Associations between early medication adherence with CDAI disease activity and low disease activity/remission (LDA/RED) at 12-months were estimated with multivariable linear and logistic regression, respectively, adjusted for age, sex and SES.

Results: The study included 245 early RA (ERA) patients, 168 (69%) were female, mean (SD) age was 57 (14), symptom duration was 5 (3) months and CDAI disease activity was high 27 (13). At enrollment, 54% of patients were treatment naïve, most initiated csDMARDs (91%) and were commonly treated with MTX (81%) over the first 3-months of RA treatment. Overall, 82% of ERA patients reported high adherence to their RA treatment at 6-months (Table). Among those reporting low/moderate adherence, 82% reported unintentional non-adherence only, 9% intentional non-adherence only and 9% both. Results of multivariable regression suggested that intentional non-adherence was associated with higher CDAI scores and lower likelihood of LDA/REM at 12-months (OR 0.1, 95% CI 0.01-0.6).

Conclusion: In this real-world patient study, approximately 1/6 of RA patients reported low/moderate adherence to their RA treatment within 6 months. Unintentional reasons for non-adherence were more frequently reported then intentional, though regression analyses suggested that intentional non-adherence may be especially associated with a lower likelihood of reaching early treatment targets. Patient adherence, particularly intentional non-adherence should be assessed early into DMARD treatment and targeted adherence strategies may be required to optimize RA outcomes.

Table 1. Early RA Medication-Taking Behavior Reported in CATCH Participants at 6-month Follow Up (N=245)

Morisky, Green, Levine Medication Assessment Questionnaire (MGL – MAQ) **Referring to medications taken in the past month prescribed by your doctor for your RA*	**Freq (%) or Mean(sd)**
Item 1: Ever forget to take your RA medicine (Yes/No)	36 (15%)
Item 2: Careless at times about taking your RA medicine	10 (4%)
Item 3: When you feel better, sometimes stop taking RA medicine	4 (2%)
Item 4: Sometimes if you feel worse when you take your RA medicine, stop taking it	6 (2%)
Total score (range 0-4; higher scores higher adherence), mean (SD)	3.77 (0.56)
0	1 (0%)
1	1 (0%)
2	7 (3%)
3	35 (14%)
4	201 (82%)
Unintentional non-adherence ("Yes" to MAQ items 1 or 2)	40 (16%)
Intentional non-adherence ("Yes" to MAQ items 3 or 4)	8 (3%)
Intentional AND non-intentional non-adherence	4 (2%)

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A Canadian Retrospective Chart Review Evaluating Concomitant Methotrexate De-escalation Patterns in RA Patients Treated With Biologic or Targeted Synthetic DMARDs

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Objectives: Rheumatoid arthritis (RA) guidelines recommend methotrexate (MTX) as anchor therapy in combination with biologic or targeted synthetic disease-modifying antirheumatic drugs (b/tsDMARDs). However, its tolerability is challenging for a significant proportion of patients. This multicenter, retrospective chart-based cohort study assessed the frequency of MTX withdrawal or tapering following initiation of a b/tsDMARD in Canadian adults with RA.

Methods: Patients were eligible if they received MTX for ≥ 3 months before initiation of a b/tsDMARD that was then prescribed continuously for ≥ 18 months.

Results: Data from 889 patients were included in the analysis. Mean age was 50.6 years and 72.6% were female. Mean time since diagnosis was approximately 8 years. Baseline mean (SD) MTX dose was 18.9 (6.63) mg/week, administered orally (57.4%), subcutaneously (41.3%), or intramuscularly (1.2%). Overall, 270 (30.4%) patients either tapered (123, 13.8%) or discontinued (147, 16.5%) their MTX within 2 years of initiating the b/tsDMARD. Methotrexate dose was unchanged for 582 (65.5%) subjects and increased for 37 (4.2%) subjects. The prescribed b/tsDMARD was most often a tumor necrosis factor inhibitor (TNFi, 52.1%), followed by a Janus kinase inhibitor (JAKi, 18.3%), other modes of action (OMA, 29.6%). The b/tsDMARD type with the highest frequency of MTX Taper or Discontinued was IL-6i (37 patients, 34.9%) followed by TNFi (144 patients, 31.1%) and JAKi (47 patients, 28.8%). The most common reasons for MTX discontinuation were patient decision (27.2%) and adverse events (24.5%). The most common reasons for MTX tapering were planned tapering (36.6%) and adverse events (29.3%). Insufficient clinical response (73.0%) was the most common reason provided for MTX increases. Baseline factors associated with MTX dose discontinuation and tapering by multiple logistic regression were a shorter time since diagnosis (Odds ratio [OR]: 0.981; 95% CI 0.964-0.999. $P = 0.0401$), use of non-DMARD medications excluding steroids (OR 0.683; 95% CI 0.503-0.929. $P = 0.0150$) and a greater number of comorbidities (OR 1.054; 95% CI 1.001-1.110. $P = 0.0444$). Interpretation of the effect of MTX dose on disease activity, fatigue, pain and functional status is challenging due to missing data, but most patients transitioned to low disease activity or remission during the study period.

Conclusion: Methotrexate withdrawal or tapering occurred in 30.4% of Canadians with RA within two years following b/tsDMARD initiation. Such proportion are generally consistent with those reported in other regions of the world. There was no evidence of worsening disease activity in these patients.

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Rheumatoid Arthritis Care Gap Time Between Prescription and Start Date: A Local Practice Audit

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Name of Drug	n	Median	Mean	Range
Hydroxychloroquine	35	0	11.2	0,188
Methotrexate	101	0	9.7	0, 73
Leflunomide	76	0	3.7	0, 97
Sulfasalazine	40	0	5.8	0, 73
Etanercept	79	8.0	92.7	0, 315
Upadacitinib	48	15.0	13.5	0, 155
Adalimumab	74	22.0	38.9	0, 183
Baricitinib	11	27.0	44.9	0, 231
Tofacitinib	94	34.0	83.3	0, 615
Abatacept	112	38.0	70.6	0, 292
Golimumab	123	40.0	79.9	1, 281
Tocilizumab	114	48.5	51.5	0, 160
Infliximab	42	51.5	17.5	0, 358
Certolizumab	68	60.0	106.4	6, 303
Rituximab	60	60.0	122.5	0, 798
Sarilumab	10	64.5	179.8	14, 161

Objectives: To examine the time gap between prescription and start date for RA patients taking biologic agents and disease-modifying antirheumatic drugs (DMARDs) in an outpatient clinical setting.
Methods: Using electronic medical records derived from a single center (Ontario), patients diagnosed with RA, had been prescribed ≥ 1 drug of interest, and had a clinic visit post Jan-01-2020 were included. Using medical charts, prescription and start dates were collected. Median, mean and range were calculated. The care gap is defined by the difference in days between prescription and start date of the drug. The drugs of interest include: JAK-1 inhibitors, anti-CD2 monoclonal antibodies, Interleukin-6 inhibitors, TNF-α inhibitors, T-cell agents, and DMARDs.
Results: A total of 560 patients (100 [17.86%] male, median [IQR] age: 63.76 [17.12]) across 16 different drugs were assessed. Care gaps are listed in order of shortest to longest duration between prescription and start date (Table 1).
Conclusion: Significant delays between prescription and start date exist. The sample size is small however, contributing to the large ranges. Drugs come in different methods of delivery, with oral medications tending to have a shorter gap in comparison to injectable (IV and subcutaneous) forms which require more time to be approved. Possible reasons for delay could include waiting for insurance approvals, financial issues, or non-adherent patients. The causes for this care gap should be further investigated in order to reduce delays in practice.

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Polypharmacy in Systemic Autoimmune Rheumatic Diseases

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Table 1: Medication adherence in the first six months of follow-up for each diagnosis using the proportion of days covered

Diagnosis	Global	DMARDS	Without DMARDS
RA	93.55 (8.84)	95.40 (6.51)	92.10 (14.40)
SLE	90.82 (12.14)	92.06 (15.95)	90.15 (12.25)
Myositis	91.03 (8.71)	98.31 (3.39)	89.86 (9.43)
Scleroderma	91.52 (9.94)	88.94 (14.73)	92.40 (8.20)

Objectives: To determine the prevalence and characteristics of polypharmacy in patients with rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), inflammatory myositis (IM) and systemic sclerosis (SS). To evaluate whether polypharmacy is associated with the level of disease control in patients with RA and SLE.
Methods: This is a retrospective observational study of data collected prospectively for participants enrolled in the Systemic Autoimmune Rheumatic Disease (SARD) biobank and database of the CHU de Québec - Université Laval. Eligible participants had to be newly diagnosed with RA, SLE, IM or SS and still be enrolled in the biobank after 24 months. Data was analyzed at baseline and at the one-year and two-year visits. Data collected included the number and type of medications, the Charlson Comorbidity Index, and the medication adherence (using the proportion of days covered for each medication during the first six months of follow-up). Polypharmacy was defined as having 5 medications or more concurrently. Logistic and linear regressions models were used to determine the impact of polypharmacy on disease control for participants with RA (DAS28CRP and CDAI scores) and SLE (SLEDAI-2K and SLAQ scores).
Results: The study included 120 participants (81 with RA, 30 with SLE, 5 with IM, and 4 with SS). The number of medications increased during follow-up in the four groups and was the lowest in the RA group. The prevalence of polypharmacy from baseline to two years increased in each group respectively for: (1) RA from 23.46% at baseline (mean (SD) = 2.1 (3.6) medications) to 51.85% at two years (5.3 (3.8)); (2) SLE from 23.33% (2.9 (5.2)) to 46.67% (6.8 (5.2)); (3) IM from 20% (2.6 (4.0)) to 100% (8.0 (3.7)); and (4) SS group from 50% (4.8 (5.5)) to 100% (9.3 (4.4)). Data on medication adherence are presented in Table 1. For participants with RA, the odds of achieving a poor outcome defined as a moderate response or no response based on the DAS28CRP score at two years were higher in the polypharmacy group [odds ratio 3.72 (95% CI 0.92-14.99)]. For SLE, a stable response or a deterioration based on the SLEDAI-2K score was not significantly influenced by polypharmacy [1.5 (0.344-6.532)].
Conclusion: Polypharmacy is very prevalent among patients with SARD and could be associated with the level of disease control in patients with RA and SLE.

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Comparison of the Systemic Lupus International Collaborating Clinics Frailty Index (SLICC-FI) and the FRAIL Scale for Identifying Frailty Among Individuals Living With Systemic Lupus Erythematosus

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Objectives: Multiple definitions for frailty exist, and how best to measure frailty in systemic lupus erythematosus (SLE) remains unclear. We aimed to assess the agreement between two frailty measures, the SLICC Frailty Index (SLICC-FI) and the FRAIL scale, for identifying frailty among SLE patients. We also evaluated differences in clinical characteristics between frail and non-frail SLE patients according to each frailty definition.
Methods: This was a cross-sectional study of consecutive adult SLE patients assessed in the Lupus Clinic at a single academic medical center from December 2020-November 2021. All participants met the 1997 revised ACR classification criteria for SLE. At a single visit, participants were assessed for disease activity, organ damage [SLICC/ACR Damage Index (SDI)], comorbidities, and health-related quality of life [Short Form 36 (SF-36)]. Using data for 48 health deficits, a SLICC-FI score was calculated for each patient. SLICC-FI scores > 0.21 defined frailty. The 5-item FRAIL scale was administered at the same visit. Patients with ≥ 3/5 items were classified as frail. Agreement between the SLICC-FI and the FRAIL scale was evaluated using Spearman rank correlation coefficients (rs) and kappa statistics (κ). As the SLICC-FI is a continuous variable, receiver operating characteristic (ROC) curve analysis was also performed to determine the

Table 1. Clinical and laboratory characteristics of SLE patients by frailty status (n=181).

	FRAIL scale questionnaire			SLICC frailty index (SLICC-FI)		
	Non-frail (n=150)	Frail (n=31)	p-value [c]	Non-frail (n=124)	Frail (n=57)	p-value [c]
Age in years, mean (SD)	52.9 (14.3)	62.7 (11.8)	**0.0004**	52.1 (13.8)	59.9 (14.2)	**0.0006**
Female, n (%)	133 (88.7)	30 (96.8)	0.319	111 (89.5)	52 (91.2)	0.721
Education, n (%)			**0.033**			**0.002**
Did not complete HS	9 (6.0)	5 (16.1)		5 (4.0)	9 (15.8)	
Completed HS	35 (23.3)	11 (35.5)		27 (21.8)	19 (33.3)	
Completed college	106 (70.7)	15 (48.4)		92 (74.2)	29 (50.9)	
Employment status, n (%)			**0.002**			**<0.001**
Employed	79 (53.0)	5 (16.1)		73 (59.4)	11 (19.3)	
Student	4 (2.7)	1 (3.2)		3 (2.4)	2 (3.5)	
Retired	37 (24.8)	15 (48.4)		30 (24.4)	22 (38.6)	
Disability	25 (16.8)	9 (29.0)		14 (11.4)	20 (35.1)	
Unemployed	4 (2.7)	1 (3.2)		3 (2.4)	2 (3.5)	
Cigarette smoking, n (%)			0.297			
Ever smokers	64 (43.0)	16 (53.3)		48 (39.0)	32 (57.1)	**0.024**
Current smokers	20 (13.4)	3 (10.0)		15 (12.2)	8 (14.3)	0.698
SLE disease duration in years, mean (SD)	19.8 (11.1)	22.4 (12.8)	0.258	18.8 (11.1)	23.3 (11.8)	**0.015**
SLEDAI-2K, median (IQR)	1 (0-2)	2 (0-2)	0.618	0.5 (0-2)	2 (0-4)	0.057
SDI, median (IQR)	1 (0-2)	2 (1-3)	**0.0003**	0 (0-2)	2 (1-3)	**0.0003**
SF-36 MCS score, mean (SD)	45.6 (13.1)	41.5 (13.3)	0.109	47.4 (12.2)	39.7 (13.8)	**0.0002**
SF-36 PCS score, mean (SD)	41.3 (11.2)	19.3 (6.7)	**<0.0001**	43.9 (10.2)	23.7 (8.1)	**<0.0001**
CRP [a] (mg/L), median (IQR)	2.5 (1.1 – 5.5)	4.0 (1.6 – 9.8)	**0.028**	2.3 (1.0 – 4.4)	4.1 (1.6 – 9.2)	**0.003**
ESR [b] (mm/hr), median (IQR)	20 (16 – 29)	26.5 (18 – 55)	**0.046**	20 (15.5 – 27.5)	24 (17 – 45)	**0.037**
Glucocorticoid use, n (%)	3 (2.0)	3 (9.7)	0.064	2 (1.6)	4 (7.0)	0.079
Antimalarial use, n (%)	84 (56.0)	11 (35.5)	**0.037**	70 (56.5)	25 (43.9)	0.115
Immunosuppressive use, n (%)	39 (26.0)	11 (35.5)	0.282	32 (25.8)	18 (31.6)	0.420
Biologic use, n (%)	3 (2.0)	1 (3.2)	0.532	1 (0.8)	3 (5.3)	0.093

SD = standard deviation; IQR = interquartile range; SDI = SLICC/ACR damage index; SF-36 = Short Form-36; MCS = mental component summary; PCS = physical component summary; CRP = C-reactive protein; ESR = erythrocyte sedimentation rate.
[a] Missing CRP values for 24 patients.
[b] Missing ESR values for 16 patients.
[c] Statistical differences between frail and non-frail patients evaluated using Fisher's exact (if cell sizes < 5) or Chi-square tests for categorical variables, t-tests for normally distributed continuous variables, and Wilcoxon rank-sum tests for non-normally distributed continuous variables.

optimal threshold SLICC-FI value based on agreement with frailty status as determined by the FRAIL scale.

Results: The 181 SLE patients were mostly female (90.1%) with mean (SD) age 54.6 (14.3) years. Mean (SD) baseline SLICC-FI score was 0.17 (0.08), with 57 patients (31.5%) classified as frail. Based on the FRAIL scale, 31 patients (17.1%) were classified as frail. There was moderate correlation between the FRAIL scale and the SLICC-FI for identifying frailty (rs = 0.639; $P < 0.0001$). Agreement occurred in 84.5% of cases ($\kappa = 0.591$; $P < 0.0001$). The ROC curve analysis yielded an AUC of 0.936, indicating excellent discriminative ability. Based on agreement with the FRAIL scale, the existing SLICC-FI cut-off value of > 0.21 was the optimal threshold for identifying frailty (Sensitivity 96.8%, Specificity 82%). For both frailty definitions, there were significant differences between frail and non-frail SLE patients in terms of age, education, employment status, SDI scores, SF-36 physical component summary scores, CRP levels, and ESR values (Table 1).

Conclusion: There is moderate agreement between the SLICC-FI and the FRAIL scale for identifying frailty among SLE patients. Each frailty metric has distinct advantages in different settings. The FRAIL scale may be useful as a point-of-care tool, while the SLICC-FI is more easily applied in existing SLE datasets. Best Abstract on Research by Young Faculty Award.

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"Systemic Lupus Erythematosus Women With Lupus Nephritis in Pregnancy Therapeutic Challenge (SWITCH)": The Systemic Lupus International Collaborating Clinics Experience

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Objectives: One-third of women with SLE develop lupus nephritis (LN), and most receive mycophenolate mofetil (MMF). However, MMF is teratogenic, and needs to be switched to a pregnancy-compatible drug preconception. Guidelines recommend azathioprine (AZA) in SLE pregnancy without providing guidance on pharmacogenetic testing [for thiopurine methyltransferase (TMPT) and nudix hydrolase 15 (NUDT15) genes] and therapeutic monitoring. Recent evidence suggests that 6-mercaptopurine (6-MP) metabolite monitoring in SLE women during preconception and/or gestation might provide opportunities to personalize therapy (eg, identification of "shunting", non-adherence). We evaluated practice patterns pertaining to SLE women with LN in the preconception and gestational periods, focusing on pharmacogenetic testing and drug monitoring.

Methods: In 02/2022, we distributed an electronic survey to 39 Systemic Lupus International Collaborating Clinics (SLICC) members affiliated with SLE referral centers. Physicians were queried about number of LN patients seen for pregnancy planning in the preceding year, the wait time they recommend prior to conception after renal response, choice of pregnancy-compatible immunosuppressive when switching from MMF, pharmacogenetic testing prior to AZA initiation, and therapeutic monitoring.

Results: We received 29 responses (rate 74%) from SLICC members in North America (52%), Europe (34%), Asia/Oceania (10%), and South America (3%). Mean number of LN patients seen in the prior 12 months for preconception counseling was 7.2 (standard deviation 6.6). Most (93%) recommended waiting for a minimal time after achieving renal response on MMF prior to transitioning to a pregnancy-compatible immunosuppressive (19% suggested ≤ 6 months, 44% 6-11 months, and 30% 12-23 months). In patients with inactive LN for ≥ 2 years, most (86%) systematically switched MMF to a pregnancy-compatible drug preconception, while 14% discontinued MMF without substituting another drug. When transitioning MMF to a pregnancy-compatible drug, the first choice was AZA (90%). When AZA could not be used, tacrolimus (TAC) was preferred over cyclosporine, CsA, by 96%. When initiating AZA, 38% never assessed TPMT genotype and/or phenotype and 97% never tested for NUDT15 gene. When switching MMF to AZA prior to conception, only 14% measured 6-MP levels. Fifty-six percent faced barriers to 6-MP testing related to access, cost, and wait times. When caring for pregnant patients on TAC or CsA, 48% performed drug monitoring each trimester, while 44% never did.

Conclusion: Our findings showed low use of pharmacogenetic testing and therapeutic monitoring among physicians caring for SLE patients. Interestingly, the optimal waiting period prior to conception after LN lacks consensus. We identified potential care gaps, which could be addressed by future pragmatic trials.

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Risk for Hospitalization, Intensive Care Unit Admission, and Mortality Among COVID-19 Patients Receiving Immunosuppressive Medications: A Population-Based SCOUT (Understanding COVID-19 in Immunosuppressed Patients) Study

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Objectives: Immunosuppressive or immunomodulatory agents (IIAs), like conventional disease-modifying antirheumatic drugs (DMARDs), anti-tumor necrosis factor (TNF) biologics, non-anti-TNF biologics, and glucocorticoids, are prescribed to patients with autoimmune rheumatic diseases, transplantations, or cancer. Patients taking IIAs were thought to be at greater risk for severe COVID-19-related health outcomes (hospitalization, intensive care unit (ICU) admission, and mortality). Objective: assess the risk for these outcomes in patients prescribed IIAs.

Methods: We conducted a retrospective cohort analysis using administrative health data from British Columbia (BC), Canada. Cohort eligibility: all BC adults testing positive on SARS-CoV-2 PCR tests from the provincial public health agency, between February 6, 2020, to August 15, 2021. IIA use within the last 3 months was defined as "current use". IIA exposure was divided into medication classes: (1) antimalarials; (2) methotrexate; (3) leflunomide; (4) immunosuppressants (azathioprine, mycophenolate mofetil (MMF), cyclosporine, cyclophosphamide); (5) anti-TNF biologics (adalimumab, certolizumab, etanercept, golimumab, infliximab); (6) non-anti-TNF biologics (abatacept, anakinra, secukinumab, tocilizumab); (7) rituximab; (8) glucocorticoids. Certain IIAs were assessed individually due to distinct mechanisms of action. Hospitalization and ICU admission data were obtained from hospital discharge abstracts. Vital statistics provided data on mortalities within 60 days of a positive SARS-CoV-2 test. We used overlap-weighted logistic regression models. Variables included age, socioeconomic status, Romano modification of the Charlson Comorbidity Index, hypertension, rurality, and number of previous SARS-CoV-2 tests.

Results: 147,301 adults tested COVID-19-positive. We included patients prescribed antimalarials (n = 307, mean age 57.4, 27.4% male), methotrexate (n = 373, mean age 55.2, 40.4% male), leflunomide (n = 60, mean age 60.3, 36.5% male), immunosuppressants (n = 409, mean age 54.3, 48.1% male), anti-TNF biologics (n = 282, mean age 45.0, 15.9% male), non-anti-TNF biologics (n = 110, mean age 50.3, 42.0% male), rituximab (n = 43, mean age 57.1, 33.6% male), and glucocorticoids (n = 1237, mean age 58.5 years, 49.2% male, median cumulative dose 250 mg), each with an equal number of comparators. Hospitalization and ICU admission risk increased in patients using immunosuppressants (any of azathioprine, MMF, cyclosporine, cyclophosphamide), MMF, or glucocorticoids, vs non-users (Table 1). Risk for ICU admission or 60-day mortality, combined, also increased for these groups vs non-users. Sixty-day mortality risk, vs non-users, only increased in glucocorticoid users.

Conclusion: Real-world data from BC shows significant greater risk for severe COVID-19 outcomes in people exposed to immunosuppressants and glucocorticoids, unlike people exposed to other IIAs, like biologics. As COVID-19 precautions phase out, these findings inform patients, clinicians, and policymakers of personal risk levels, need for personal precautions, prescription alterations, or epidemiological programs like booster vaccinations. Best Abstract by an Undergraduate Student Award.

Table 1. Association between Current Immunosuppressive Medication Use and Severe COVID-19 Outcomes

	Hospitalizations		ICU admissions or 60-day mortality		ICU admissions		60-day mortality	
	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Conventional DMARDs								
Antimalarial users (n=307)	46 (14.98)	0.80 (0.52, 1.23)	30 (9.77)	0.92 (0.55, 1.56)	16 (5.21)	0.97 (0.48, 1.95)	19 (6.19)	1.04 (0.54, 2.01)
Non-users (n=307)	55 (17.92)	1.00 (ref)	32 (10.42)	1.00 (ref)	17 (5.54)	1.00 (ref)	19 (6.19)	1.00 (ref)
Methotrexate users (n=372)	58 (15.59)	1.28 (0.85, 1.94)	19 (5.11)	0.64 (0.35, 1.17)	14 (3.76)	0.84 (0.41, 1.75)	8 (2.15)	0.50 (0.21, 1.22)
Non-users (n=372)	47 (12.63)	1.00 (ref)	28 (7.53)	1.00 (ref)	16 (4.30)	1.00 (ref)	14 (3.76)	1.00 (ref)
Immunosuppressant users (n=409)	137 (33.50)	2.08 (1.51, 2.87)	66 (16.14)	1.62 (1.07, 2.44)	58 (14.18)	2.88 (1.73, 4.78)	23 (5.62)	0.78 (0.44, 1.37)
Non-users (n=409)	80 (19.56)	1.00 (ref)	43 (10.51)	1.00 (ref)	22 (5.38)	1.00 (ref)	29 (7.09)	1.00 (ref)
Azathioprine users (n=115)	23 (20.00)	1.24 (0.63, 2.42)	7 (6.09)	0.70 (0.26, 1.88)	7 (6.09)	1.12 (0.37, 3.37)	≤5 (*)	*
Non-users (n=115)	19 (16.52)	1.00 (ref)	10 (8.70)	1.00 (ref)	6 (5.22)	1.00 (ref)	6 (5.22)	1.00 (ref)
Mycophenolate mofetil users (n=178)	90 (50.56)	2.82 (1.81, 4.40)	42 (23.60)	1.93 (1.11, 3.36)	35 (19.66)	2.52 (1.34, 4.74)	15 (8.43)	1.01 (0.48, 2.11)
Non-users (n=178)	47 (26.40)	1.00 (ref)	24 (13.48)	1.00 (ref)	16 (8.99)	1.00 (ref)	15 (8.43)	1.00 (ref)
Cyclosporine users (n=118)	21 (17.80)	1.28 (0.64, 2.58)	12 (10.17)	1.39 (0.56, 3.45)	11 (9.32)	2.47 (0.81, 7.56)	5 (4.24)	0.87 (0.25, 3.02)
Non-users (n=118)	17 (14.41)	1.00 (ref)	9 (7.63)	1.00 (ref)	5 (4.24)	1.00 (ref)	6 (5.08)	1.00 (ref)
Leflunomide users (n=60)	13 (21.67)	1.03 (0.43, 2.45)	6 (10.00)	0.78 (0.25, 2.49)	≤5 (*)	*	≤5 (*)	*
Non-users (n=60)	13 (21.67)	1.00 (ref)	7 (11.67)	1.00 (ref)	≤5 (*)	1.00 (ref)	≤5 (*)	1.00 (ref)
Anti-TNFs								
Anti-TNF users (n=282)	27 (9.57)	1.11 (0.62, 1.97)	10 (3.55)	0.91 (0.38, 2.18)	≤5 (*)	0.66 (0.21, 2.05)	≤5 (*)	0.77 (0.24, 2.46)
Non-users (n=282)	24 (8.51)	1.00 (ref)	11 (3.90)	1.00 (ref)	8 (2.84)	1.00 (ref)	7 (2.48)	1.00 (ref)
Non-anti-TNFs								
Non-anti-TNF users (n=110)	11 (10.00)	0.67 (0.29, 1.52)	≤5 (*)	*	≤5 (*)	*	≤5 (*)	*
Non-users (n=110)	16 (14.55)	1.00 (ref)	8 (7.27)	1.00 (ref)	6 (5.45)	1.00 (ref)	≤5 (*)	1.00 (ref)
Rituximab users (n=43)	16 (37.21)	2.24 (0.86, 5.87)	16 (37.21)	2.24 (0.86, 5.87)	7 (16.28)	2.61 (0.62, 11.03)	≤5 (*)	2.04 (0.41, 10.00)
Non-users (n=43)	9 (20.93)	1.00 (ref)	≤5 (*)	1.00 (ref)	≤5 (*)	1.00 (ref)	≤5 (*)	1.00 (ref)
Glucocorticoids								
Glucocorticoid users (n=1237)	270 (21.83)	1.63 (1.36, 1.96)	224 (18.11)	1.69 (1.35, 2.12)	120 (9.70)	1.86 (1.37, 2.54)	150 (12.13)	1.58 (1.21, 2.06)
Non-users (n=1237)	256 (20.70)	1.00 (ref)	143 (11.56)	1.00 (ref)	68 (5.50)	1.00 (ref)	100 (8.08)	1.00 (ref)

*Unable to be reported due to small sample size

Abbreviations: aOR, adjusted odds ratio; DMARDs, disease-modifying anti-rheumatic drugs; ICU, intensive care unit; TNFs, tumor necrosis factor

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Trajectories of Depression in Adults With RA Over the First 2 Years of the COVID-19 Pandemic: Results From the Canadian Early Arthritis Cohort (CATCH)

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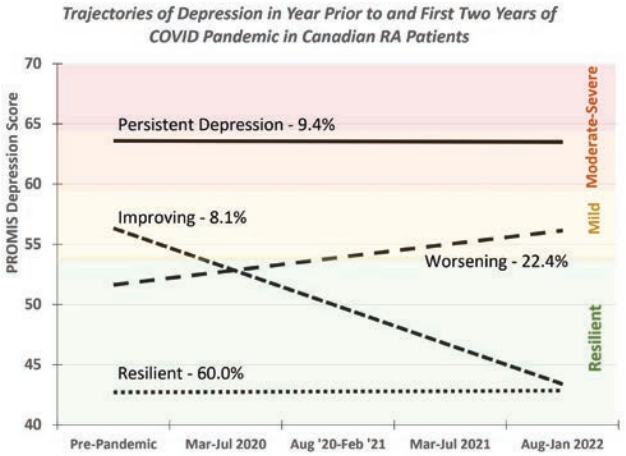
Objectives: Growing evidence points to considerable mental health impacts of the prolonged COVID-19 pandemic though data from longitudinal studies in rheumatic diseases are sparse. We explored distinct trajectories of depressive symptoms in the year prior to and throughout the first 2-years of the COVID-19 pandemic in adults with RA.

Methods: The Canadian Early Arthritis Cohort (CATCH) is a prospective multi-center inception cohort of adults with RA who receive care from rheumatologists across Canada. Prior to the pandemic, participants completed patient-reported assessments of symptoms and function (ie, PROMIS-29 and patient global) and rheumatologists conducted examinations during in-person study visits. After March 2020, ongoing collection of key outcomes continued at in-person and remote visits. We used group-based trajectory modeling to identify latent groups of participants with depression (PROMIS 4a depression score ≥ 55) in participants with ≥ 1 visits in the year prior to the pandemic (3/19-2/20) and ≥ 1 visits during



pandemic (3/20-1/22) and identified pre-pandemic individual and clinical characteristics and PROs associated with each trajectory.

Results: The sample included 989 participants with a mean (SD) age of 60 (14) and disease duration of 6 (4) years. 73% were women, 84% White, 60% had some post-secondary education, and 77% were in CDAI REM/LDA at visit closest to the start of pandemic. The best model included 4 groups (posterior probabilities ≥ 0.80 for each group): (1) Resilient (none-minimal depression throughout: N = 594; 60%); Worsening (none/minimal to mild: N = 222; 22%); Improving (mild-resilient: N = 80; 8%); and Persistent (moderate-severe throughout: N = 93; 9%) (see Figure). As compared with the Resilient group, those with Worsening Depression were significantly (*P*'s < 0.02) more likely to be female, obese, have a higher pre-pandemic CDAI, MD and patient global, and report worse pain, disability, anxiety, depression, fatigue, sleep, and participation.

Conclusion: Although 60% of CATCH RA patients had consistently good mental health during the first 2 years of the pandemic, > 1 in 5 reported deteriorating mood suggesting a cumulative impact over time; 9% had persistent depression and 8% improving mood. The proportion of CATCH participants with at least mild symptoms of depression was more than double that reported for the Canadian population. As compared with those with good mental health throughout, participants with worsening depressive symptoms were more likely to be female, obese, have higher pre-pandemic disease activity, symptoms, disability, and higher impairments in participation. Given the impact of depression on QoL, inflammation, and disease management, vulnerable groups may benefit from more frequent evaluation and additional support from rheumatology providers.

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A National Vasculitis Patient Survey on Perspectives of Social Determinants of Health as Barriers to Accessing Care

Kareena Nanda (University of Alberta, Edmonton); Elaine Yacyshyn (Division of Rheumatology, University of Alberta, Edmonton)

Objectives: To determine the level of unmet social needs in patients with vasculitis and the impact of those needs on their access to care.

Methods: Participants were recruited from the Vasculitis Foundation Canada and asked to participate in a primarily quantitative survey about individuals' social needs and potential barriers in accessing care. A 20-question social needs assessment was developed and included in the survey to ask about social determinants of health (SDOH) including, housing, food security, environmental factors, and social/emotional well-being. Data was collected using REDCap and descriptive analysis was performed.

Results: Preliminary data was collected from 52 respondents (mean age of 56, 83% were female, 92% were White (European Descent), 54% reside in urban areas). According to the social needs assessment, 56% of participants had at least one unmet need. Social and emotional health (31%), food security (22%), health literacy (19%) and financial security (17%) were noted as common unmet needs. When asked if any of these unmet social needs were barriers in accessing care for their vasculitis, 31% of all participants noted social and emotional wellbeing as a barrier. As shown in Figure 1, financial insecurity (30%), poor health knowledge (28%), lack of transportation (19%) and discrimination or unfair treatment in the healthcare setting (16%) were also noted as barriers. Discrimination was noted as a major barrier to accessing care by 50% of participants who reported having faced discrimination. Of the participants who lacked transportation, 75% reported the need to travel for appointments as a barrier to accessing care. When asked what changes participants would like to see to improve access to care, 52% felt rheumatology clinics should offer virtual visits for follow-up appointments, 52% would like access to patient support groups, and 48% voted for increased access to educational materials on vasculitis. 92% of participants also suggested that rheumatologists should be involved in the management of social needs whether by screening for/counseling on SDOH or giving referrals to other resources. However, only 63% noted ever discussing social determinants of health with their rheumatologist.

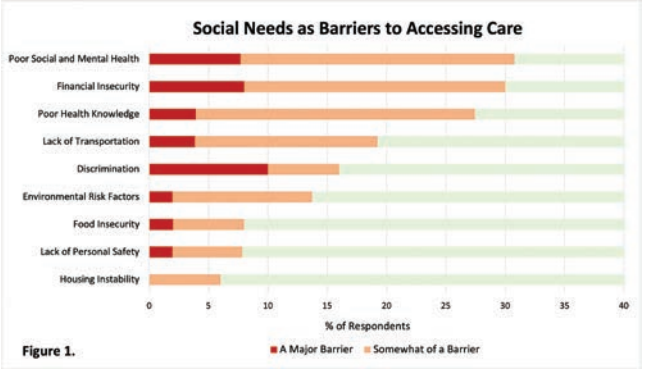

Figure 1.

Conclusion: There has been growing evidence showing that SDOH impact health outcomes, however few studies have evaluated their role in access to care. Participants in this study noted that several SDOH represent barriers to accessing the care they require. The data presented here speaks to the need for increased awareness of and innovative solutions to unmet social needs by health care professionals at all levels of care.

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Patient Appropriateness for Total Knee Arthroplasty and Predicted Probability of a Good Outcome

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Objectives: Total knee arthroplasty (TKA) is considered an effective treatment for knee osteoarthritis (OA), but 15-30% of recipients report little symptom improvement or dissatisfaction with results, questioning their surgical appropriateness. In prior research, we interviewed people with OA and orthopedic surgeons and identified four appropriateness domains as important: demonstrable TKA need, health status, psychological readiness/willingness for, and realistic expectations of, TKA. The current study asked: Do pre-operative measures of these domains predict patient's likelihood of achieving a good post-operative TKA outcome?

Methods: In knee OA patients undergoing primary TKA, we assessed TKA appropriateness domains: TKA need (WOMAC pain, KOOS PS-SF), readiness/willingness (PASS knee symptoms, PHQ-8 depression, willingness to consider TKA), health status (BMI, comorbidities, smoking), and TKA expectations (HSS TKA Expectations scale) and contextual factors (age, sex, social support, prior joint replacement) pre-operatively. A good outcome was defined as symptom improvement (OARSI-OMERACT responder criteria) AND satisfaction (very/somewhat) with results 1-year post-TKA. Log Poisson Regression was used to identify independent predictors of a good TKA outcome based on adjusted risk ratios. Logistic regression was used to assess model

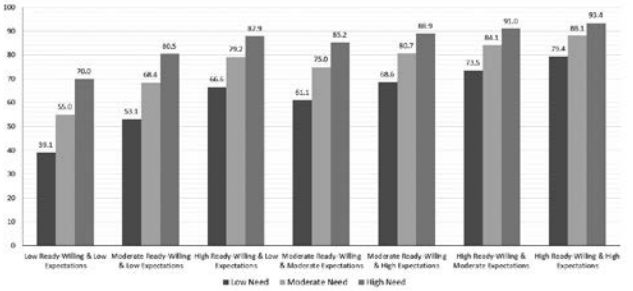

Figure 1. Estimated Probability of a Good TKA Outcome by TKA Appropriateness Criteria

discrimination (optimism corrected area under the ROC curve, AUC). Final model predictors for each of TKA need, readiness/willingness and expectations, separately, were categorized into three levels of TKA appropriateness (low, moderate, high) and predicted probabilities were calculated for worst- and best-case scenarios.

Results: Of 1053 TKA recipients (mean age 66.9 years [SD 8.8]; 58.6% female), 78.1% (95% CI 75.4-80.5%) achieved a good outcome. In multivariable Poisson regression, the probability of a good TKA outcome was higher with greater TKA need (adjusted RR per 10-unit increase: WOMAC pain 1.03, 95% CI 1.01-1.05, KOOS-PS 1.06, 95% CI 1.03-1.08), greater TKA readiness/willingness (adjusted RR: unacceptable knee symptoms 1.14, 95% CI 1.03-1.27; definitely willing 1.20, 95% CI 1.05-1.37; PHQ-8 per 10-unit increase 0.94, 95% CI 0.89-0.99), and for those who considered improved ability to go upstairs or perform recreational activities "very important" (adjusted RR 1.15, 1.02-1.30 and 1.10, 1.01-1.20, respectively). The model that included TKA need, readiness/willingness and expectations had good discrimination (optimism corrected AUC 0.70). The predicted probability of a good outcome ranged from 39.1% (95% CI 29.3-49.8%) to 93.4% (95% CI 90.1-95.6%) for those deemed least and most appropriate, respectively (Figure 1).

Conclusion: While external validation is required, we encourage physicians to consider patients' readiness, willingness, and expectations for surgery in TKA decision-making as doing so may improve the proportion of TKA recipients who experience a good surgical outcome.

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Underdiagnosis and Undertreatment of Knee Osteoarthritis in Persons With Type 2 Diabetes: A Cross-Sectional Study

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Objectives: Knee osteoarthritis (OA) commonly co-occurs in people with type 2 diabetes, and been associated with increased risk for diabetes complications. The extent to which OA is diagnosed and managed in individuals with type 2 diabetes, however, is unclear. We sought to assess: (1) the prevalence of symptomatic knee OA in persons with type 2 diabetes, including the proportion who had received a physician diagnosis; and (2) the extent to which OA therapies had been used.

Methods: This was a descriptive cross-sectional study of individuals with type 2 diabetes ≥45 years old recruited from endocrinology clinics at three academic hospitals in Toronto, Canada. Participants completed standardized online questionnaires. We defined knee OA as fulfilling NICE UK criteria: activity-exacerbated knee pain, morning joint stiffness ≤ 30 min, and no history of inflammatory rheumatic disease. Participants were asked to indicate if they had consulted a health professional, received a diagnosis, and any treatments used (yes/no, from list) for their joint symptoms. We calculated the prevalence of chronic lower extremity joint symptoms and symptomatic knee OA. Of those with symptomatic knee OA, we calculated the proportion who had sought care from a health professional, received a diagnosis, and had used OA therapies.

Results: Our study included 166 participants: mean age 66.9 (SD 9.4) years, 48.2% women, 83.1% had a post-secondary education, and mean BMI 29.4 (SD 6.7) kg/m^2. Of 44 (26.5%) who fulfilled NICE criteria for knee OA, 29 (65.9%) had discussed their joint symptoms with a health professional (family physician most frequent) and 20 (45.5%) reported receiving any diagnosis for their joint symptoms. In those with knee OA, reported use of therapies was as follows, n (%): acetaminophen 30 (68.2), oral NSAIDs 20 (45.5); topical NSAIDs 26 (59.1); opioids 3 (6.8); joint injections 6 (13.6); physical therapy assessment 19 (43.2); physical activity and/or exercise program 15 (34.1); weight management 12 (27.3); brace 3 (0.7); gait aid 7 (15.9); and mind body activities 4 (9.1).

Conclusion: In this cross-sectional study of persons with type 2 diabetes, we confirmed a high prevalence of chronic musculoskeletal symptoms, with 43.4% reporting chronic knee symptoms and one in four fulfilling NICE criteria for knee OA. However, less than half meeting criteria for knee OA had received a diagnosis, and recommended OA treatments were underused. Further research should assess the impact of strategies to increase recognition of and diagnosis of knee OA, and improve implementation of OA care, on diabetes outcomes.

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Association Between Knee Osteoarthritis and Health-Related Quality of Life in Persons With Type 2 Diabetes

Lauren King (University of Toronto, Toronto); Esther Waugh (University of Toronto, Toronto); Ian Stanaitis (Women's College Research Institute, Women's College Hospital, Toronto); Alanna Weisman (University of Toronto, Toronto); Baiju Shah (University of Toronto, Toronto); Lorraine Lipscombe (University of Toronto, Toronto); Gillian Hawker (University of Toronto, Toronto)

Objectives: Knee osteoarthritis (OA) and type 2 diabetes commonly co-occur and both negatively impact health-related quality of life (HRQoL). However, the extent to which knee OA symptoms further impact the HRQoL of individuals with type 2 diabetes is unknown. Our objective was to assess the relationship between symptomatic knee OA (yes/no) and HRQoL in persons with type 2 diabetes and, if a relationship was found, to determine if it is due to depressed mood, sleep disturbance, fatigue, and/or walking limitation, which we hypothesized could be explanatory factors.

Methods: This was a cross-sectional study of individuals with type 2 diabetes ≥ 45 years old recruited from endocrinology clinics at three academic hospitals in Toronto, Canada. Participants completed standardized online questionnaires that assessed sociodemographic factors, comorbidities to calculate the functional comorbidity index (FCI), depressed mood (PROMIS Depression 8b), sleep disturbance (PROMIS Sleep Disturbance 4a), fatigue (PROMIS Fatigue 4a), walking limitation (Health Assessment Questionnaire walking difficulty item), HRQoL (EQ-VAS), and joint symptoms. Knee OA was defined as fulfilling NICE UK clinical criteria (activity-exacerbated knee pain, morning joint stiffness ≤ 30 minutes, no history of inflammatory rheumatic disease). We used linear regression to assess the association between knee OA (yes/no) and HRQoL, adjusting for potential confounders (age, gender, education level, BMI, and FCI). We then examined the effect of further adjustment for depressed mood, sleep disturbance, fatigue and walking limitation on the knee OA estimate of effect.

Results: Our study included 166 participants. Mean age was 66.9 (SD 9.4) years, 48.2% women, 83.1% had a post-secondary education, mean BMI 29.4 (SD 6.7) kg/m^2, and 44 (26.5%) fulfilled NICE criteria for knee OA. Mean HRQoL was 62.3/100 (higher = better; SD 20.5). Individuals with knee OA had worse HRQoL, sleep, fatigue, depressed mood, and walking limitation ($P < 0.01$ for all) compared to those without. After adjustment, the presence of comorbid symptomatic knee OA was associated with worse perceived HRQoL (ß -7.33, 95% CI -14.67 to 0.004). Sleep, fatigue and depressed mood were moderately correlated (Spearman $r = 0.42$ to $r = 0.64$). Adding any of these variables, or walking limitation, into the model fully attenuated the association between knee OA and HRQoL.

Conclusion: Symptomatic knee OA has important adverse effects on the HRQoL of persons living with type 2 diabetes. Our results suggest that this may be due to any of OA's downstream effects. Efforts to address quality of life in individuals with type 2 diabetes must include increased attention to diagnosis and treatment of OA.

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Pentosan-induced Thrombocytopenia and Thrombosis in a Patient With Osteoarthritis, a Case

Yanzhu Xu (University of British Columbia, Vancouver); Ravi Parmar (VIHA, Victoria); Jeremy Murray-Guenther (VIHA, Victoria); Brothers Alex (Saanichton)

Background: Pentosan polysulfate (PPS) is a semisynthetic heparinoid

used most commonly for chronic interstitial cystitis, and like heparin, it can induce thrombocytopenia and thrombosis. In recent years, it has been used by some clinicians for the management of osteoarthritis (OA).

Case: A previously healthy 48-year-old patient presented to hospital with chest pain and thrombocytopenia 6 days after starting intramuscular Pentosan polysulfate (PPS) for knee osteoarthritis. On imaging, he had extensive coronary, carotid, and descending aortic thrombosis, requiring urgent percutaneous coronary intervention and monitoring in a high acuity unit. A coagulopathy work-up was negative, and platelet count continued to decrease during initial treatment with IV unfractionated heparin; thus, it was suspected he had PPS-induced thrombocytopenia and thrombosis (PITT). Pathophysiologically, PITT is similar to that of heparin-induced thrombocytopenia (HIT). We applied a standard risk stratification tool and confirmed the diagnosis with HIT-antibodies and serotonin release assays. All heparin products were stopped, and the patient was anticoagulated with argatroban. There was no thrombosis progression on follow-up imaging.

Conclusion: OA is a prevalent chronic disease that affects the quality of life of approximately 3.9 million Canadians. Here we report a rare life-threatening case of thrombocytopenia and arterial thrombosis in a patient using PPS for OA. As the search for an effective OA drug continues, clinicians may encounter adverse events caused by off-label use of uncommonly seen medication. Early diagnosis of a drug-related adverse event requires a high index of suspicion, and a close review of unfamiliar medication is essential. This case may provide valuable insights for Rheumatologists who may encounter patients treated with PPS.

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Vascular Injury Derived Exosomes Stimulate Lymphocyte Infiltration in the Kidney of Lupus-Prone Mice

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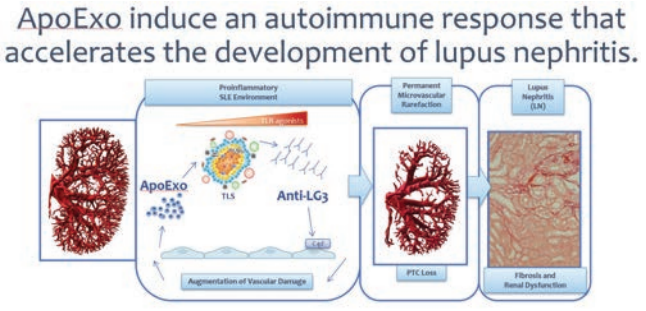
Objectives: Lupus nephritis (LN) is a severe manifestation of systemic lupus erythematosus (SLE), affecting 50% of SLE patients and progressing to end-stage renal disease (ESRD) in 30% of cases.[1] Microvascular damage is an emerging contributing factor to LN renal dysfunction leading to ESRD. [2] We have demonstrated that apoptotic exosomes derived from vascular injury (ApoExo) trigger the production of SLE-associated antibodies and LG3-targeted autoantibodies (anti-LG3). ApoExo infusion induces anti-LG3 production in wild-type mice and tertiary lymphoid structure (TLS) formation in a murine vascular allograft model.[3] The presence of the active 20S proteasome is a distinctive feature of these EVs When proteasome activity is blocked with bortezomib, approved for medical use proteasome inhibitor, there is a significant reduction in anti-LG3 levels, TLS formation and vascular rejection.[3] We described anti-LG3 autoantibodies in humans and demonstrated that anti-LG3 triggers microvascular rarefaction and renal fibrosis in a mouse model of spontaneous SLE. We hypothesize that apoptotic exosomes derived from vascular injury induce an autoimmune response that accelerates the development of lupus nephritis.



Methods: Twenty weeks old NZB/WF1 mice (SLE model) were infused with apoptotic exosomes (ApoExo) or vehicle every second day for 3 weeks. Every 2 weeks, blood samples were collected to quantify circulating anti-LG3 levels by ELISA and ApoExo levels by hs-FCM. At sacrifice, kidneys were collected for renal histology. Renal interstitial damage and leukocyte infiltration were assessed with H&E, CD3, CD20, AID and IL17 immunohistochemistry staining.

Results: NZB/WF1 mice infused with ApoExo show higher levels of anti-LG3 compared with the vehicle group. ApoExo infused NZB/WF1 mice demonstrate significant inflammatory infiltration compared to mice infused with vehicle. Immunohistochemistry analysis shows that ApoExo infusion triggers the recruitment to the renal interstitium of CD3+ and CD20+ lymphocytes (T and B cells respectively) into nodules reminiscent of TLS. Finally, heightened renal interstitial damage and decreased survival was observed in ApoExo infused NZB/WF1 mice compared to the one infused with vehicle (Figure 1).

Conclusion: This project is, to our knowledge, the first to evaluate the contribution of vascular injury derived extracellular vesicles to LN. ApoExo infusion increases renal nodular lymphocyte infiltration, autoantibody production increase renal damage in lupus-prone mice. A better understanding of the impact of vascular injury derived immune mechanisms will improve the identification, prediction and management of LN.

References: [1.] Rijnink EC. Clin J Am Soc Nephrol 2017;12:734-43. [2.] Anutrakulchai S. BMC Nephrol 2016;17:169. [3.] Dieude M. Am J Transplant 2020;20:726-38. Best Abstract on Basic Science Research by a Trainee Award.

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Expanding Diagnostics in Antiphospholipid Syndrome: A Case of Young Woman With Possible Non-criteria Antibody-Mediated Antiphospholipid Syndrome

Milica Tanic (McMaster University, Hamilton); Konstantinos Tselios (McMaster University, Hamilton)

Background: To describe a case of a patient with recurrent pregnancy losses suspected to have antiphospholipid syndrome mediated by non-criteria antibodies.

Antiphospholipid syndrome (APS) is a pro-thrombotic autoimmune disorder characterized by recurrent thrombotic or obstetric complications. Diagnostic criteria include history of thrombosis or obstetric complications with positive antiphospholipid antibodies on two occasions measured 12 weeks apart.[1]

Case: We report the case of a 29-year-old female G11T1P1A10L1 with a history of several miscarriages and intrauterine fetal demise. She was referred to our service after 10th pregnancy at which time testing for antiphospholipid antibodies revealed a low-titer anticardiolipin IgM of 13.8 MPL which was below the standard reference cut-off considered positive by Sapporo Criteria.[2] However, anticardiolipin IgG, lupus anticoagulant and anti-β2 glycoprotein-I were negative. Her dsDNA was found to be positive at 14 IU/mL with otherwise negative anti-nuclear antibodies and no other clinical symptoms of systemic lupus erythematosus (SLE) or an alternative connective tissue disease. Pathology analysis of prior products of conception revealed no anatomical or chromosomal abnormalities to explain the recurrent obstetric losses. The patient had a normal karyotype and negative screening bloodwork for Factor V Leiden and metabolic disease. After her 10th pregnancy she was started on hydroxychloroquine and aspirin daily. Two months later she became pregnant at which time daily low molecular weight heparin injections were started. Unfortunately, she experienced another miscarriage at approximately 14 weeks gestation. Pathology revealed no fetal or placental abnormalities. Given ongoing desire for pregnancy, monthly IVIG was initiated.

Conclusion: We suspect our patient may be an example of seronegative APS (SN-APS) possibly mediated by "non-criteria" antiphospholipid antibodies given that no other medical cause was identified for her obstetric history. SN-APS is an emerging diagnosis proposed in the case for patients

with clinical history supportive of APS but negative serology.[1] Analysis of such antibodies in this patient would provide more substantial support for anticoagulation in pregnancy as indicated for cases of definite APS and would thus impact clinical care. This case illustrates the challenge in providing guideline-directed therapy to patients with history but not laboratory features of APS and the need for expanded diagnostics in APS. References: [1.] Pignatelli P. Haematologica 2020;105(3):562-572. [2.] Miyakis S. J Thromb Haemost 2006;4(2):295-306.

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Age and Severity of Lupus Nephritis, But Not Ethnicity, Associated With Renal Biopsy in Patients With Systemic Lupus Erythematosus

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Objectives: We have previously demonstrated more frequent lupus nephritis (LN) and worse renal outcomes in non-White ethnic groups. In this analysis, we examined whether there were ethnic differences in frequency of SLE patients undergoing renal biopsy, or in the International Society of Nephrology/Renal Pathology Society (ISN/RSP) biopsy class.

Methods: In this single-center retrospective cohort study, demographic data and clinical variables for all SLE patients seen since 2002 were extracted from their medical records and an SLE research database. Renal biopsy data was acquired from medical records and a Renal Biopsy Registry Database, which includes all local renal biopsies since 2002. Ethnicity was by self-report. Chi-square, *t* tests, and one-way ANOVA were used for univariate comparisons.

Results: 543 patients were included in this analysis: 87% were female, 48% White, 31% Indigenous, 18% Asian, and 4% Other. Renal involvement (meeting 1997 revised ACR criteria) was seen in 229 patients (42%) and was more common in all non-White ethnic groups ($P < 0.001$): White 26%, Asian 64%, Indigenous 55%, and Other 45%. Patients with LN were younger at disease onset (LN = 32 ± 15 yrs, no LN = 41 ± 16 yrs; $P \leq 0.001$). Among LN patients, White patients were older at SLE onset ($P < 0.001$): White = 39 ± 14 yrs, Asian = 29 ± 14 yrs, Indigenous = 29 ± 13 yrs, and Other = 36 ± 21 yrs. Among patients with renal involvement, 126 (47%) had a renal biopsy. Those who had a biopsy were younger at SLE onset: biopsy = 29 ± 14 yrs, no biopsy = 35 ± 14 yrs ($P = 0.001$). There were no differences between ethnic groups in proportion of patients undergoing biopsy ($P = 0.413$): White 49% (n = 33), Asian 63% (n = 39), Indigenous 56% (n = 50), and Other 44% (n = 4). There was no difference in ISN/RSP biopsy class between ethnic groups ($P = 0.9$): % with Class IV/V: White 73% (n = 24), Asian 80% (n = 31), Indigenous 72% (n = 36), and Other 100% (n = 4). Although in most cases no reason was identifiable, the most common reason found for not having a renal biopsy was clinically mild LN.

Conclusion: A greater proportion of Indigenous and Asian SLE patients had LN compared to White patients. Patients with LN were overall younger than those without LN. Most patients undergoing renal biopsy had ISN/RSP LN class IV or V. In patients with LN, we did not see ethnic differences in the proportion undergoing a renal biopsy, or in biopsy results (LN class). Future studies should examine overall patterns of care and treatment, care gaps including adherence and loss to follow-up, and the impact of socioeconomic factors and distance from care on LN outcomes.

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Going Beyond Pain: Virtual Meetings and Survey to Expand the JIA Option Map With Other Symptoms and Functional Activities

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Objectives: In addition to commonly experiencing pain, young people with juvenile idiopathic arthritis (JIA) often experience swelling, stiffness, fatigue and psychological symptoms. These symptoms negatively impact a wide range of functional activities, yet young people with JIA and their families often require more information and decision support on a variety of ways to manage these symptoms and help them participate fully in functional activities. As such, the current study aimed to expand the JIA Option Map, a web-based patient decision aid for JIA pain management, to include other relevant symptoms and functional activities. We sought to identify which symptoms and which aspects of daily function should be added to the JIA Option Map.

Methods: Our team is comprised of 35 members, including patient partners, health care providers (HCPs) and researchers, with expertise in JIA, shared decision-making and research methods. HCPs include a wide range of professionals: pediatric rheumatologists, nurses, occupational therapists, physical therapists, psychologists, social workers and dietitians. First, we held a series of seven virtual research team meetings to identify and discuss the various symptoms and functional activities that were relevant to young people with JIA. Subsequently, we developed and distributed an online survey to members of our research group to agree on which elements to add to the JIA Option Map.

Results: A total of 17 individuals completed the survey, including four patient partners, 11 HCPs from four different professions and seven researchers. A total of 14 respondents felt that symptoms beyond pain, and ways to manage these additional symptoms, should be added to the app. Respondents rated fatigue, stress, anxiety, joint stiffness, poor sleep, feeling down and swelling as the most relevant to add to the app. A total of 13 respondents felt that functional activities should be added, as well as tips to help young people participate in daily activities. Respondents rated all categories of functional activities as relevant, with school and leisure being rated the highest, followed by activities of daily living and work activities.

Conclusion: Our team of patient partners, healthcare professionals and researchers identified physical and psychological symptoms, as well as a range of functional activities that should be added to the JIA Option Map. Next steps will include consensus on how to integrate this information into the app to help young people with JIA manage symptoms and function in their daily life. Supported by a CIORA grant.

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Clinical Features of Patients With Connective Tissue Disease-Related Interstitial Lung Disease

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Objectives: Objectives: Interstitial lung disease (ILD) is a well described complication of connective tissue diseases (CTD). We describe a Canadian cohort of patients with CTD-ILD with an emphasis on clinical, serologic, and imaging characteristics.

Methods: Methods: We conducted a retrospective cross-sectional study of all patients seen at the ILD clinic of a tertiary care center since its inception in January 2013 to April 2022. Patients were included if they had a diagnosis of ILD as per current International Guidelines and clinical diagnosis of CTD by expert opinion of a rheumatologist. Patients were excluded if their ILD was found to be due to another cause, such as drug-related or hypersensitivity pneumonitis. Clinical symptoms and serologic markers were recorded.

Results: 78 patients with CTD-ILD were recorded in total. 41 (52%) patients were female. Most patients were diagnosed with rheumatoid arthritis (n = 46, 59%), followed by systemic sclerosis (n = 13, 17%), inflammatory myositis (n = 10, 13%) and Sjogren's syndrome (n = 8, 10%). The most common clinical symptom was inflammatory arthritis (n = 34, 44%), followed by Raynaud's phenomenon (n = 18, 23%) and sclerodactyly (n = 13, 17%). ANA was positive in 43 (55%) of patients. The most common ENA was anti-Ro52 (n = 9, 12%), followed by anti-RNP (n = 7, 9%) and anti-Ro60 (n = 6, 8%). Of the patients with rheumatoid arthritis, 27 (59%) were positive for RF, 29 (63%) were positive for anti-CCP and 12 (26%) were seronegative for both. 29 (37%) patients met criteria for UIP pattern. 21 (27%) patients died over the course of their follow-up.

Conclusion: All patients with ILD should receive workup for CTD. In this Canadian cohort of patients with CTD-ILD, the most common diagnosis was seropositive rheumatoid arthritis, and the most common symptom was inflammatory arthritis.

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A Novel Qualitative Online Community Analysis: Thoughts and Experiences of Behcet's Disease From Participants on a Reddit Subforum

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Objectives: This study investigates the perspectives and experiences of people affected by Behcet's disease by examining the content shared and discussed on a subforum of the website Reddit, an online space for anonymous discussions.

Methods: All discussion threads posted between March 9th, 2021 to March 12th, 2022, including posts and comments, were examined from the subforum r/Behcets, an anonymous online community of 1100 members as of March 2022. A Grounded Theory analysis was completed to identify themes and subthemes, and notable quotes were extracted from the threads. Parameters extracted from each post include Date of Original Post, Number of Comments, Net Upvotes, Category, and Subcategories.

Results: A total of 196 discussion threads were examined, consisting of 46, 38, 36, 37, 34, and 5 threads under the categories of Symptoms, Patient Support, General Topics, Treatments, Diagnosis, and Miscellaneous, respectively (Table). Six recurring themes and 16 subthemes were identified from the posts and comments in these discussions. Theme 1 is about finding connectedness through shared experiences, and subthemes include feeling understood by others, discussions regarding similarities, and seeking perspectives from others. Theme 2 illustrates the struggles of the diagnostic odyssey, captured through the subthemes of the lengthy diagnostic process, negative experiences with the healthcare system, and presenting symptoms to settings outside of rheumatology. Discussions around symptoms are described in Theme 3, which includes the subthemes of stress being a trigger, the severity of symptoms, and the symptomatic variety. Theme 4 characterizes some of the emotional experiences of having Behcet's disease through the subthemes of feeling lonely and misunderstood, as well as impact on mental health. Theme 5, illustrating the ways the disease affects quality of life, is further explored through the disease's impact on activities, education/work, and relationships. Finally, inquiries and shared experiences around COVID-19 and vaccinations are explored through Theme 6.

Table: Number of Threads in Each Categories and Subcategory of Topics

Categories		Subcategories	
Symptoms	46	Oral Ulcers	4
		Genital Ulcers	2
		Other Dermatological Symptoms	3
		Joint Pain	1
		Neurologic Symptoms	9
		Gastrointestinal Symptoms	1
		Ophthalmological Symptoms	2
		Other Symptoms	9
		Symptom Patterns	17
Patient Support	38	Communities	5
		Experiences and Quality of Life	33
General Topics	36	Curiosity and Speculation	7
		Requesting Information	6
		Sharing Information	7
		COVID-19 and Vaccination	14
Treatments	37	Options	5
		Treatment-specific Inquiry	19
		Non-pharmacological Treatments	3
		Barriers to Treatment	4
		Other Treatment-Related Inquiry	2
		Treatment Side Effects	4
Diagnosis	34	Seeking Advice	31
		Investigations	3
Miscellaneous	5	Miscellaneous	5

Conclusion: By examining the discussions in a popular and anonymous online forum, this novel study provides an exploration of the perspectives and experiences of people affected by Behcet's disease. Overarching themes that emerged include: the challenges in the diagnostic process, the severity and variety of symptoms, and the disease's impact on quality of life. This understanding also shines light on the needs of people affected by Behcet's disease, gaps and areas for improvement in the offline support received by people who are affected by the disease, as well as the need for adequate awareness of the disease from a wide spectrum of care providers.

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A Clinical Audit on Diagnostic and Treatment Patterns of Polymyalgia Rheumatica in a Community Rheumatology Practice

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Objectives: Polymyalgia rheumatica (PMR) remains a clinical challenge given the absence of single diagnostic test. Clinical audits are an excellent tool to both measure and improve clinical care in a focused manner. After a period of change, the audit can be repeated to ensure improved patient care. Given how difficult PMR diagnosis and management can be, we conducted a clinical audit on a sample population from our community practice.

Methods: Firstly, a "snap shot" of patients diagnosed with PMR seen between January - March 2021 was performed. The National Institute for Health and Care Excellence guideline for clinical audit of PMR was used. The following was extracted: demographics, nature and duration of symptoms, baseline investigations, and treatment (prednisone dosing and bone health protection). Assessment included: 1. how often patient met British Society of Rheumatology (BSR) inclusion criteria for diagnosis; 2. how thorough baseline investigations were; and 3. what steroid protocol was established, and how bone health was addressed. Secondly, an audit template was generated and applied at first visit for patients with new diagnosis of PMR. The same parameters were extracted for analysis.

Results: 69 patients were identified. Only 10% of patients met the BSR core inclusion criteria for diagnosis. This was driven by short duration of morning stiffness (70% < 45 minutes, 48% < 30 minutes, and 17% no morning stiffness). Treatment with glucocorticoids was ubiquitous; dose was wildly variable: 8.7% were started on < 10 mg/day, 10% at 10 mg/day, 44% at

15 mg/day, and 35% at > 15 mg/day. This was reflected by the variability in prescriber: 49% started by primary care team, 26% by emergency room doctor, and 25% by rheumatologist. Bone health was disappointing: only 35% of patients were on bisphosphonate, and only 46% on vitamin D. After application of the audit template, data on 11 patients was collected. 73% met core inclusion criteria. Treatment remained uniform; dose stayed variable: 9% started on < 10 mg/day, 45% on 15 mg/day, and 45% at > 15 mg/day. Again, prednisone prescribing varied: 70% by primary care team, 10% by ER, and 20% by rheumatologist. Bone health, however, improved markedly; ALL patients were on bone sparing therapy and vitamin D.

Conclusion: This audit highlighted that PMR management leaves significant room for unification of prednisone treatment and bone health management. Implementation of a simple EMR tool resulted in robust improvement in bone health; tackling initial prednisone treatment, however, will likely require improving education for initial prescribers.

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Management of Giant Cell Arteritis in Canada: A Cross-Sectional Survey

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Objectives: Giant cell arteritis (GCA) is the most common primary vasculitis in adults. In recent years, significant research efforts have allowed us to appreciate the complexity of numerous diagnostic modalities, clinical phenotypes, and therapeutic options. In available GCA guidelines, several recommendations leave uncertainties in disease investigation and management. Variability in clinical practice may therefore occur among physicians. The purpose of this study was to explore variations in clinical practice among physicians that manage GCA across Canada.

Methods: An online, web-based, English survey was sent to medical specialists who manage patients with GCA across Canada, mostly rheumatologists, internists, and ophthalmologists, through their respective provincial and national societies. To construct this survey, a literature review was done to identify areas of disease management uncertainties. PubMed, EMBASE, CENTRAL (Cochrane Central Register of Controlled Trials), and ClinicalTrials.org were consulted, from January 2000 until March 2021. The survey consisted of 4 main sections: demographics, investigations, new-onset disease therapy and relapsing disease therapy. The survey was open from December 2021 to April 2022.

Results: A total of 92 physicians responded (60 rheumatologists, 26 internists and 6 ophthalmologists) with 90% following GCA on a long-term basis. 43% of participants had been practicing for ≥ 10 years and 58% had an academic hospital-based practice. 40% of physicians managed ≥ 20 patients with suspected or confirmed GCA annually, while 34% had ≥ 5 patients with ocular involvement per year. As part of the initial work up for GCA, 91% of physicians used temporal artery biopsy, 58% used cranial doppler ultrasound, 31% used large-vessel computed tomography angiography, 8% used cranial high-resolution positron emission tomography and 4% used cranial magnetic resonance angiography. Choice of glucocorticoids (GC) route for treatment initiation varied according to clinical presentation: 98% of respondents prescribed oral GC in the absence of ocular symptoms and 39% gave intravenous (IV) GC in the presence of non-specific ocular involvement. In patients with ischemic visual symptoms, 98% of physicians initiated IV GC. For new-onset GCA without ocular involvement, 52% of physicians used GC monotherapy. For patients with new transient ischemic ocular involvement, 61% of clinicians combined GC with another IS therapy. Concomitant IS therapy was used by 89% of physicians when patients presented with relapsing GCA with ischemic ocular symptoms.

Conclusion: This Canadian survey confirms the variability of practice among specialists who manage GCA. Multiple available guidelines, uncertainties in optimal investigations and treatments, and limited accessibility of certain diagnostic modalities may explain this variability in GCA management.

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VIVA QI: Vaccination in Vasculitis – Applying a Quality Improvement Approach for Immunosuppressed Patients

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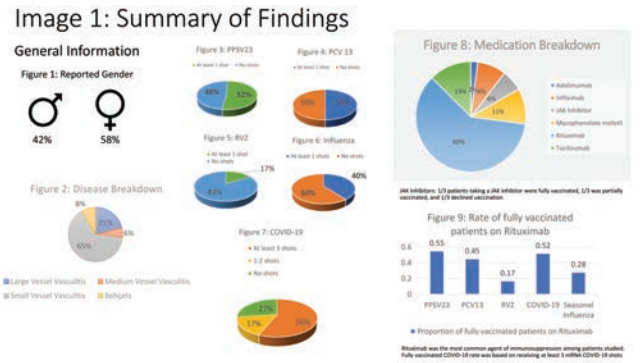
Objectives: Vasculitis is an umbrella term comprising ~20 rare conditions that are characterized by the destructive inflammation of the blood vessels. Considered rare, vasculitides are serious conditions which in most cases require immunosuppression to prevent damage of organs or death. Although essential, immunosuppression increases the risk of infection and vaccine-preventable diseases. The CRA, EULAR, and ACR recommend immunization for patients receiving immunosuppression but to date there are limited data available on the rates of immunization among patients living with vasculitis.[1,2] The objective of this research is to report the vaccination rates among vasculitis patients receiving immunosuppressive therapies in one clinic.

Methods: Current practice at the Calgary Vasculitis Centre is to have the nursing team record the vaccination status of patients at each appointment and recommend missing/incomplete vaccinations. To determine present vaccination rates, patient charts for the period of July 1, 2021 to July 1, 2022 were reviewed for vaccination by type (pneumonia [PPSV23, PCV13], shingles [RVZ], Influenza, COVID-19). Ethics approval was obtained for this project.

Results: 48 patient charts were reviewed in this analysis. 58% of patients were female; the mean and median patient ages were 55 and 58 respectively. For pneumonia vaccination, 52% of eligible patients received PPSV23 and 50% had received PCV13. For vaccination against shingles, 12.5% of eligible patients were fully vaccinated; 5% were partially vaccinated. Against influenza, 39.6% were vaccinated (18.8% receiving the high dose vaccine). Against COVID-19, 56.3% received at least 3 doses, 16.7% received 1-2 doses, and 27.1% were unvaccinated (Image 1).

Conclusion: These results provide novel data on vaccination rates in patients living with vasculitis and receiving immunosuppression. Compared to provincial rates, the influenza vaccination rates (39.6% vs 26.8%) and triple vaccinated against COVID-19 rates (56.3% vs 38.4%) were higher for patients at our center.[3] This may be due to nursing follow-up at the time of patient appointments and rheumatologist recommendation. The rates of PCV13, PPSV23, and RVZ do not have general population comparisons in Alberta, but our findings represent valuable potential benchmark data for other vasculitis researchers. Additionally, our findings also highlight a potential opportunity for PCV 15 and PCV20 to improve pneumonia vaccination rates. This research will form the basis for future research into the rates



of vaccine-preventable disease, rates flare post-vaccination, efficacy of a dedicated vaccination promotion program, and reasons for vaccine hesitancy in patients living with vasculitis. References: [1.] Hazlewood G. J Rheumatol 2021;48(8):1330-9. [2.] Furer V. Ann Rheum Dis 2019;79(1):39-52. [3.] Bass AR. Arthritis Rheumatol 2023;75(3):333-48.

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VEXAS Syndrome: Insights From a Canadian Case Series

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Objectives: VEXAS (vacuoles, E1 enzyme, X-linked, autoinflammatory, somatic) syndrome is a recently described condition in the literature caused by mutations at UBA1. Typical features of VEXAS syndrome include male gender, age over 50, vasculitis, hematologic features, and steroid responsiveness but resistance to steroid-sparing therapies. This case series contributes to the literature by describing the clinical features of our cohort and presenting a rare case of VEXAS syndrome in a female.

Methods: At two Western Canadian academic centers, we reviewed patients with genetically confirmed VEXAS syndrome or patients with clinical presentations suspicious for VEXAS syndrome who were subsequently confirmed to have the causative UBA1 mutation via genetic testing at the National Institutes of Health.

Results: Six patients with VEXAS syndrome were identified. Five were male and one was female (Turner Syndrome). Three somatic UBA1 variants were seen (4/6 patients with variant p.Met41Thr, 1/6 with p.Met41Leu, and 1/6 with p.Met41Val). Initial diagnoses for these patients included relapsing polychondritis (3/6), vasculitis (2/6), and the others were diagnosed with erythema nodosum, malignancy NYD, and adult-onset Still's disease. Constitutional symptoms (any combination of fever, fatigue, weight loss, and/or night sweats) were experienced by all patients. All patients had elevated CRP and/or ESR; IL-6 and IL-18 were elevated in the one patient who underwent a cytokine panel. All patients developed macrocytic anemia; thrombocytopenia was seen in 3/6. A positive p-ANCA was noted in one patient, but MPO and PR3 were negative and there were no clinical features suggestive of ANCA-associated vasculitis. 5/6 had cutaneous findings: 4/6 had perivascular lymphocytic infiltration on biopsy, 1/6 presented with atypical tumid lupus. 4/6 had pulmonary findings ranging from capillaritis affecting the small to medium-sized arteries and veins in an ANCA-negative patient to organizing pneumonia.

Conclusion: These findings constitute the second Canadian case series on VEXAS syndrome. Patients with VEXAS syndrome may represent a cohort of treatment-resistant cases within other established diseases. The characteristics of steroid responsiveness and dependence combined with the presence of constitutional symptoms, macrocytic anemia, cutaneous findings such as perivascular lymphocytic infiltrates, and/or pulmonary findings should raise clinical suspicion for VEXAS syndrome. Notably, the X-linked nature of this condition does not mean it is male-exclusive. This case series describes a rarely reported instance of VEXAS syndrome in a woman (Turner syndrome). In future screening schema, we suggest the consideration of VEXAS syndrome in individuals with Turner Syndrome presenting with compatible symptoms.

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Use of Shared Model of Care in Community Rheumatology Practice to Improve Efficacy and Reduce Wait Times. A Calgary Experience

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Objectives: As a chronic inflammatory condition, rheumatoid arthritis incidence is on the rise in Canada requiring more integration of care with multiple health care providers. In addition, rheumatology patients require a variety of health-related needs due to the complexity of their disease and therapeutics. The objective of this study was to describe a shared model of care with both rheumatologist and nurse patient care in improving diagnosis and treatment of patients with early rheumatoid arthritis (RA).

Methods: In our study, we describe our experience with 50 patients diagnosed with new rheumatoid arthritis from January 2020 to January 2022 and through a retrospective analysis through data analysis of EMR records to review efficacy and assess reduce wait times. Review of charts for patient satisfaction and perception were reviewed.

Results: In our review of the 50 cases, patient satisfaction was observed in the majority of cases. Our chart review demonstrated that overall wait times were reduced in the majority of cases, allowing for earlier detection of RA and earlier treatment. Patients' perception, captured during initial interview by primary rheumatologist is reported. Patients' perception of the shared model of care was overall satisfaction. The model allowed patients to express their concerns with more than one care provider, reduce face-to-face appointments and improve overall efficacy.

Conclusion: A shared model of care in rheumatoid arthritis patients in our community rheumatology practice improved patient care, patient satisfaction and allowed for early detection of rheumatoid arthritis. The patient's perception of this model of care allows for the development of longitudinal studies for quality improvement.

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Number of Fingers With Soft Tissue Edema Visualized on Musculoskeletal Ultrasound as a Diagnostic Test for Psoriatic Arthritis: A Pilot Cohort Study

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Objectives: Musculoskeletal ultrasound (MSKUS) is more sensitive than physical examination to detect inflammation in extra-articular structures in psoriatic arthritis (PsA). Peritendinous soft tissue edema on MSKUS has shown to be more frequent in PsA. Here we assess the degree of association between the presence of flexor compartment (FC) soft tissue edema and the

Table: Patient demographics and disease characteristics

	PsA patients N:9	All RA patients N:21	p (All RA vs PsA)
Age	48.2±12,2	59.9±14.8	**0.047[a]**
Sex			
Male	3 (33.3%)	5 (28.3%)	0.666[b]
Female	6 (66.7%)	16 (76,2%)	
Length of time since diagnosis	1.0 (12.5)	15.0 (21.5)	**0.007[c]**
Steroid current	2 (28.6%)	6 (28.6%)	1.00[b]
Currently using csDMARDs	6 (66.7%)	15 (71.4%)	1.00[b]
Previous bDMARD	3 (33.3%)	11 (52.4%)	0.440[b]
TJC-66	19 (21)	8 (22)	0.137[c]
CCP positive	1 (12.5)	11 (52.4%)	0.093[b]
RF positive	2 (22.2)	12 (57.1%)	0.118[b]
Dactylitis current	2 (22.2)	-	N/A
BMI	29.8 (10.8)	25.0 (8.0)	**0.028[c]**
Total GS score*	8.0 (1.5)	6.0 (2.5)	**0.022[b]**
Total PD Score*	4.0 (4.0)	3.0 (2.0)	0.104[b]
PD score =2 in four fingers*	1 (11.1%)	0 (0%)	0.300[a]
GS score =2 in four fingers*	4 (44.4%)	4 (19.0%)	0.195[a]
PD score =2 in ≥3 fingers*	4 (44.4%)	1 (4.8%)	**0.019[a]**
GS score =2 in at ≥3 fingers*	6 (66.7%)	8 (38.1%)	0.236[a]

RA = rheumatoid arthritis, PsA = psoriatic arthritis GS = Grayscale, PD = power Doppler, csDMARD = conventional synthetic disease modifying antirheumatic drug, bDMARD = biologic disease modifying antirheumatic drug, TJC-66 = tender joint count using 66 joint count.

*Semiquantitative score of soft tissue edema (0-2) within the flexor compartment images in 2nd and 3rd digits

[a]: Independent samples t test [b]: Fisher exact test [c]: Mann Whitney u test

Median(IQR), Mean±SD

diagnosis of PsA with the aim of developing a soft tissue score to differentiate PsA from rheumatoid arthritis (RA).

Methods: This pilot prospective cohort study included 9 PsA and 21 RA patients from the Biologics Clinic at a single-center site in Ottawa. Patients are referred to the biologics clinic if they require initiation of, or changes to their biologic disease-modifying antirheumatic drug (bDMARD). In addition to demographic and clinical data, eight MSKUS images were collected from each patient including one Grayscale (GS) and one power Doppler (PD) image of the FC of the 2nd and 3rd bilateral digits using a GE LogicE9 and a linear 15 MHz probe. Images were scored on a 0-2 semiquantitative scale to assess the degree of soft tissue edema, where 0 indicates absent, 1 indicates mild, and 2 indicates severe GS or PD. Following data collection, scoring was completed by two investigators blinded to the patients' diagnosis and in random order. Consensus decision was taken as the final score.

Results: Disease characteristics are provided in the Table. On MSKUS, PsA patients had a statistically significant higher mean total GS score compared to RA (8.0 vs 6.0, $P = 0.022$). A significantly higher number of PsA patients had PD score of 2 in ≥ 3 fingers (44.4% PsA vs 4.8% RA, $P = 0.019$) as well as numerically higher GS score of 2 in ≥ 3 fingers (66.7% PsA and 38.1% RA, $P = 0.236$) (Table).

Conclusion: Our results suggest a possible role for FC soft tissue edema visualized on MSKUS in both GS and PD modes to differentiate PsA from RA. It is also important to understand the impact of soft tissue edema on disease pathogenesis and patient-reported outcomes. While our sample size is small, reaching statistical significance using non-parametric testing encourages us to repeat this analysis again in the future as our cohort grows. When our sample size allows, we will assess for confounding effect of seropositivity, sex, age, BMI, previous therapy, and disease duration.

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Long-Term Treatment With Golimumab is a Safe Treatment Option Regardless of Risk Factors in Patients With Rheumatoid Arthritis, Psoriatic Arthritis, and Axial Spondyloarthritis: Results From a Real-World Canadian Setting

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Objectives: Tumor necrosis factor inhibitor (TNFi), golimumab (GLM), has demonstrated efficacy and favorable safety profile in rheumatic diseases. Janus kinase inhibitors (JAKi) safety studies sparked new discussions in Rheumatology, while real-world evidence for GLM continues to support its long-term safety profile. This post hoc analysis describes the risk of major adverse cardiovascular events (MACE), malignancy, and mortality in a large observational cohort of patients (pts) with RA, PsA, or axSpA treated with subcutaneous (SC) GLM. Serious adverse events (SAEs) and serious infections (SIs) were also assessed.

Methods: Multicenter, prospective, BioTRAC registry collected real-world clinical, laboratory, safety, and patient-reported data in RA, PsA, and axSpA patients treated with GLM, infliximab, or ustekinumab. Pts treated with SC GLM were included, excluding one pt with prior JAKi treatment. The incidence rates (IR) per 100 patient-years (PYs) of AEs of special interest (AEoSI): MACE [defined as cardiovascular death, non-fatal myocardial infarction, or non-fatal stroke], malignancies excluding non-melanoma skin cancer, all-cause death, SAEs and SIs, irrespective of causality to GLM, and time to onset were assessed in subgroups based on the following factors: < 65 vs ≥ 65 years of age; sex; TNFi experience; smoking status; baseline (BL) use of methotrexate (MTX) and oral steroids. All analyses were stratified by indication.

Results: 529 RA, 281 PsA, and 421 axSpA pts were included. Over 1064 (RA), 539 (PsA), and 675 (axSpA) PYs, the IR for MACE were 1.1 (n = 12), 0.0, and 0.0 events/100 PYs, respectively, while IR for malignancies were 1.4, 0.4, and 1.0/100 PYs. SAE incidence ranged from 7.6/100 PYs in PsA pts to 11.4 in RA pts and that of SIs from 1.3/100 PYs in PsA pts to 2.3 in RA pts. IRs for all-cause mortality were 0.7/100 PYs (n = 7), 0.2 (n = 1), and 0.3 (n = 2) /100 PYs in RA, PsA, and axSpA, respectively. Summaries of AEoSI incidence by presence/absence of risk factors are in the Table; although numerical differences were observed, there were no new safety signal. Higher age was associated with shorter time to MACE in RA pts; no significant association was observed with sex, TNFi experience, smoking, and concomitant MTX or steroid use.

Conclusion: GLM treatment in a real-world diverse population are consistent with the current safety profile. This was irrespective of the examined risk factors for RA, PsA and axSpA. Higher age was associated with shorter time to MACE in RA pts. GLM remains a safe option for the treatment of rheumatic diseases.

Table. Summary of AEs of Special Interest During GLM Treatment by Risk Factor

Risk Factor		RA (N=529) IR (# of Events / PY)				PsA (N=281) IR (# of Events / PY)				axSpA (N=421) IR (# of Events / PY)			
		MACE	Malignancy*	Death	SAE	SI	MACE	Malignancy*	Death	SAE	SI	MACE	Malignancy*	Death	SAE	SI
Age	≥65 years	2.40	4.20	2.10	19.19	3.00	0.00	1.20	1.20	22.85	8.42	0.00	5.73	2.87	27.21	7.17
	<65 years	0.55	0.14	0.00	7.81	1.92	0.00	0.22	0.00	4.82	0.00	0.00	0.50	0.00	6.28	1.65
Sex	Male	1.73	1.40	0.00	14.73	3.36	0.00	0.69	0.00	6.18	0.34	0.00	1.37	0.23	8.69	1.37
	Female	0.90	1.41	0.90	10.15	1.93	0.00	0.00	0.40	9.28	2.42	0.00	0.42	0.42	8.01	3.79
Prior TNFi Use	TNFi-Exp	0.00	3.18	0.79	11.92	2.38	0.00	1.88	0.00	15.06	4.71	0.00	1.79	0.00	13.30	4.47
	TNFi-Naive	1.28	1.17	0.64	11.30	2.24	0.00	0.00	0.23	5.77	0.46	0.00	0.88	0.36	7.96	1.78
Current Smoking	Yes	0.49	1.97	0.99	14.28	4.43	0.00	1.11	1.11	13.37	0.00	0.00	0.57	0.00	12.61	3.44
	No	1.29	1.29	0.58	10.64	1.75	0.00	0.22	0.00	6.51	1.57	0.00	1.20	0.40	7.02	1.80
Concomitant MTX Use	Yes	0.93	0.55	0.40	10.65	2.40	0.00	0.30	0.30	9.66	2.11	0.00	0.48	2.99	19.43	7.47
	No	1.60	3.52	1.28	13.12	1.92	0.00	0.48	0.00	4.33	0.00	0.00	0.66	0.00	7.24	1.65
Concomitant Steroid Use	Yes	0.92	0.52	0.61	9.80	1.23	0.00	0.00	0.00	11.53	0.96	0.00	6.57	2.19	17.53	0.00
	No	1.23	1.63	0.68	12.07	2.71	0.00	0.46	0.23	6.66	1.38	0.00	0.66	0.16	7.78	2.38

IR: incidence rate; Exp: Experienced; MTX: methotrexate; PYs: patient years; SAEs: serious adverse events; SI: serious infection; TNFi: tumor necrosis factor inhibitor.
*Excluding non-melanoma skin cancer.

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Joint Pain and Diarrhea Outside the Realm of IBD

Ali Shams (University of Calgary, Calgary)

Background: Whipple's disease is an uncommon, multi-system, chronic disorder caused by the rod-shaped bacterium Tropherrma whipplei. It can present with polyarthritis, fever, and CNS manifestations. It is a masquerader of inflammatory diseases and thus there is often a significant delay in diagnosis and treatment, which can lead to poor clinical outcomes.

Case: A 51-year-old male was referred to Rheumatology by Internal Medicine for 1 month history of watery diarrhea, 10 kg weight loss, progressive normocytic anemia, and migratory joint arthritis involving his ankles and knees. CRP was 17.4. CT abdomen showed free fluid and retroperitoneal stranding. EGD showed duodenitis. Duodenal biopsies came back positive for Tropheryma whipplei. On review of systems, the patient endorsed headaches concerning for CNS involvement. Lumbar puncture was positive for Tropheryma whipplei in the CSF. MRI brain showed leptomeningeal enhancement consistent with an infectious or inflammatory process. A course of appropriate antibiotics was started for Whipple's disease with CNS involvement. Within three days all symptoms resolved. Whipple's disease is an uncommon, multi-system, chronic disorder caused by the rod-shaped bacterium Tropheryma whipplei. It can present with polyarthritis, fever, and CNS manifestations. It is a masquerader of inflammatory diseases and thus there is often a significant delay in diagnosis and treatment, which can lead to poor clinical outcomes.

Conclusion: The following case presentation explores Whipple's disease: the diagnostic challenges, the spectrum of clinical presentation, and treatment options, which lack general consensus.

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Racial and Ethnic Disparities in Disease-Related Outcomes Among Patients With Systemic Lupus Erythematosus: A Systematic Review

Teresa Semalulu (McMaster University, Hamilton); Keerthana Pasumarthi (McMaster University, Hamilton); Kevin Zhao (McMaster University, Hamilton); Rauda Rauda AlDaheri (McMaster University, Hamilton);

Nadine Akbar (Humber River Hospital, Toronto); Karen Beattie (McMaster University, Hamilton); Konstantinos Tselios (McMaster University, Hamilton)

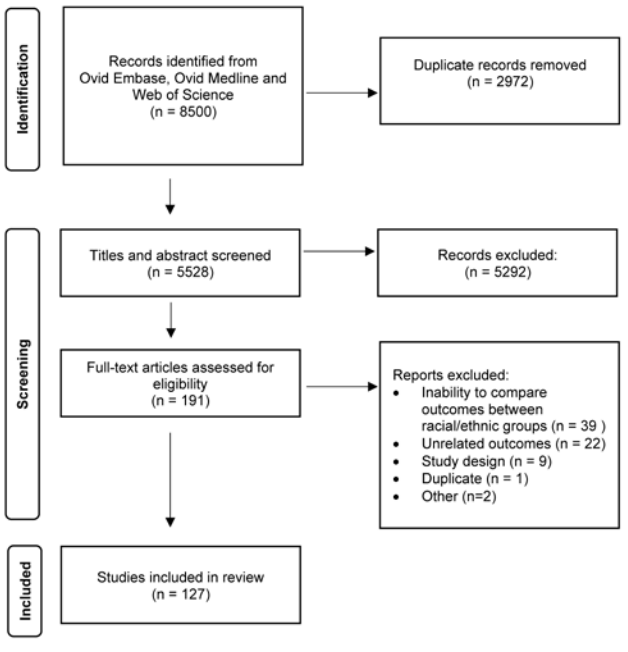
Objectives: Systemic lupus erythematosus (SLE) disproportionately impacts racial and ethnic minorities, with these patients generally experiencing worse disease-related outcomes. This is likely related to a complex interplay between genetic and non-genetic factors. Numerous studies have examined racial and ethnic disparities in SLE, with no comprehensive summary of disease-related outcomes and health care utilization among these patients. The objective of this systematic review is to describe racial and ethnic disparities in the following disease-related outcomes among adult patients with SLE: (1) mortality, (2) end-stage renal disease (ESRD), (3) disease-related damage, (4) cardiovascular disease, (5) malignancy, and (6) hospital utilization.

Methods: A systematic search of the scientific literature was performed to obtain articles published before October 2021. Search terms included the outcomes of interest (ie, mortality, ESRD) and variations of terms used to describe racial and ethnic groups (eg, White, Black, Asian, Hispanic, Indigenous). Longitudinal observational studies with at least two years of follow-up were included. Screening of titles, abstracts and full-text articles were performed in duplicate (TS, KP, KZ, RA). Data extraction was performed using Covidence. Data were synthesized using descriptive statistics and narrative descriptions.

Results: A total of 5528 titles and abstracts were yielded from the systematic literature search, of which 127 studies were selected for inclusion (Figure 1). Most studies were conducted in North America (n = 99) and Europe (n = 16), with few studies performed in Australia (n = 7), Africa (n = 6), Asia (n = 6) and South America (n = 3). Studies identified the following racial and ethnic groups: Whites (n = 122), Blacks (n = 133), Asians (n = 51), Indigenous peoples (n = 20), Hispanics (n = 48) and others (n = 6). Most studies (n = 102, 80%) identified worse outcomes among racial and ethnic minority groups. Disparities were most commonly identified in studies describing outcomes among Black (n = 93) and Hispanic (n = 37) patients. A total of 60 studies reported outcomes related to mortality, with 52 (87%) reporting worse outcomes among racialized groups. Among 30 studies reporting on the development of ESRD, 26 (87%) identified racial and ethnic disparities. Worse outcomes were also reported among studies examining disease-related damage (n = 20, 67%), cardiovascular disease (n = 8, 89%), hospitalization (n = 7, 88%), and malignancy (n = 4, 50%).

Conclusion: This systematic review highlights the higher reported rates of mortality, ESRD, disease-related damage, cardiovascular disease, malignancy and hospitalization, among racial and ethnic minority patients with SLE. In the absence of a biological explanation to entirely account for these differences, it is prudent to identify and address systemic causes for these outcomes. A meta-analysis of these outcomes is currently underway.

Figure 1: PRISMA flow diagram



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Does Concurrent Inflammatory Bowel Disease Alter the Profile of Axial Spondylarthritis?

Yassir Daghistani (University of Toronto, Toronto); Patricia Remalante-Rayco (University Health Network, Toronto); Tina Chim (University Health Network, Toronto); Sareh Keshavarzi (University of Toronto, Toronto); Robert Inman (University of Toronto, Toronto); Nigil Haroon (University of Toronto, Toronto)

Objectives: Axial Spondyloarthritis (AxSpA) and inflammatory bowel disease (IBD) are chronic inflammatory conditions which often coexist. Immunopathology studies have demonstrated that gut inflammation plays a fundamental role in AxSpA pathogenesis. We hypothesized that AxSpA patients with clinical gut inflammation would have an altered clinical phenotype.

Methods: This is a retrospective study to assess the differences in clinical features between patients who have AxSpA alone vs those with concurrent IBD (AxSpA/IBD). We extracted relevant data from the University Health Network (UHN) Spondylitis Program database, from March 2008 to December 2021. The characteristics of the patients in the two groups (Table 1) are compared by either chi-square, independent sample *t* test,

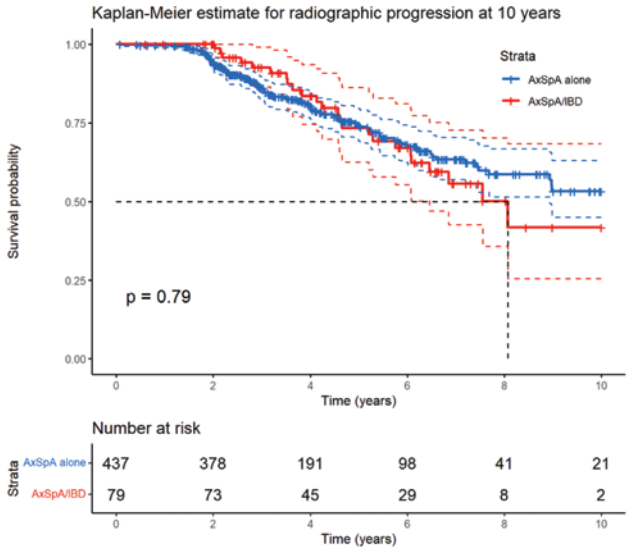
Table 1.

Variables		AxSpA alone	AxSpA + IBD	p-value
Number		1331 (87)	195 (13)	-
Age		43.0 (13.8)	42.0 (13.1)	0.42
Gender:	Female	449 (34)	68 (35)	0.82
	Male	882 (66)	127 (65)	
Diagnosis:	AS	1102 (83)	168 (86)	0.28
	nr-axSpA	229 (17)	27 (14)	
Age at diagnosis	AxSpA	31.2 (12.1)	29.3 (11.7)	0.13
	IBD	-	26.2 (12.4)	-
Juvenile onset AxSpA		117 (10)	27 (16)	**0.019**
CRP		10.3 (17.3)	13.4 (18.2)	**0.0018**
BASDAI		4.7 (2.5)	4.5 (2.5)	0.31
BASFI		3.6 (2.8)	3.4 (2.9)	0.4
BASMI		3.7 (0.8)	3.7 (0.8)	0.62
ASDAS-CRP		2.8 (1.2)	2.8 (1.2)	1
mSASSS		10.1 (17.0)	9.4 (15.0)	0.63
PGDA		4.8 (2.9)	4.3 (3.0)	**0.037**
Smoke ever		477 (38)	75 (41)	0.61
HLA-B27 positive		985 (77)	109 (59)	**<0.001**
Uveitis ever		427 (32)	77 (39)	**0.049**
Peripheral arthritis ever		136 (10)	27 (14)	0.13
Psoriasis ever		185 (14)	40 (21)	**0.02**
Dactylitis ever		23 (2)	4 (2)	0.77
Enthesitis ever		401 (30)	72 (37)	0.056
Fibromyalgia		317 (24)	44 (23)	0.77
Cardiac disease ever		317 (24)	44 (23)	0.77
Cancer ever		62 (5)	11 (6)	0.67
Family history of AxSpA		232 (17)	41 (21)	0.19
Family history of IBD		94 (7)	42 (22)	**<0.001**
NSAIDs current		787 (59)	66 (34)	**<0.001**
csDMARDs current		137 (10)	41 (21)	**<0.001**
bDMARDs current		546 (41)	116 (59)	**<0.001**
NSAIDs prior		847 (64)	110 (56)	0.062
csDMARDs prior		260 (20)	73 (37)	**<0.001**
bDMARDs prior		479 (36)	91 (47)	**0.0051**

Table 2.

Outcomes over 6 years		AxSpA alone		AxSpA + IBD		p-value
		n	Mean ±SD	n	Mean ±SD	
Radiographic progression:						
nr-axSpA progression to AS:	No	45		5		1.000
	Yes	16		1		
Change in mSASSS		149	4.99 ±9.19	40	3.68 ±5.98	0.278
Disease activity:						
AUC BASDAI		425	38.32 ±23.1	69	41.07 ±27.0	0.427
AUC ASDAS-CRP		338	23.64 ±10.6	56	26.49 ±11.6	0.088
Metrology:						
Change in BASMI		427	0.23 ±1.0	74	0.26 ±1.3	0.852

Figure 1.



or the non-parametric Wilcoxon sign rank test for non-normal numeric variables. In Table 2, we measured the outcomes for radiographic progression, disease activity and metrology between the two groups over 6 years using Fisher's exact test, *t* test, or Exact Wilcoxon rank sum test where indicated. Area under the curve (AUC) measures were calculated using the trapezoidal method for annual BASDAI and ASDAS-CRP over 6-year follow-up period. We have also used Kaplan-Meier estimate for radiographic progression (Figure 1) between the two groups over the years. *P*-value shown within the plot indicates log-rank test between curves.

Results: The study includes 1526 patients, with 1331 patients diagnosed with AxSpA alone vs 195 patients diagnosed with AxSpA/IBD. Most of the patients are White/Caucasian in ethnicity (75%). HLA-B27 positive was more common in AxSpA alone patients. At baseline and over 6 years, there were no statistically significant differences in disease activity (BASDAI and ASDAS-CRP) or severity (as defined by the mSASSS or progression from nr-AxSpA to AS) between the two groups. However, the level of inflammation measured by CRP was higher in patients with AxSpA/IBD. In addition, juvenile onset AxSpA and skin psoriasis were more likely in patients with AxSpA/IBD than in patients with AxSpA alone. Moreover, we found that conventional synthetic and biological DMARDs were more commonly used in the AxSpA/IBD patients while the use of NSAIDs was less common.

Conclusion: We found that juvenile onset AxSpA was associated with AxSpA/IBD, indirectly implicating a gut-triggered process in disease onset. HLA-B27 was less common, and CRP was higher in AxSpA/IBD. Clinical metrics of disease activity, radiographic severity or metrology did not differ between the groups at baseline and over 6 years. Thus, clinically evident gut inflammation does not confer a more severe phenotype on AxSpA. Best Abstract on Spondyloarthritis Research Award.

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The Risk of Demyelinating Diseases in Spondyloarthritis: A Longitudinal Cohort Study

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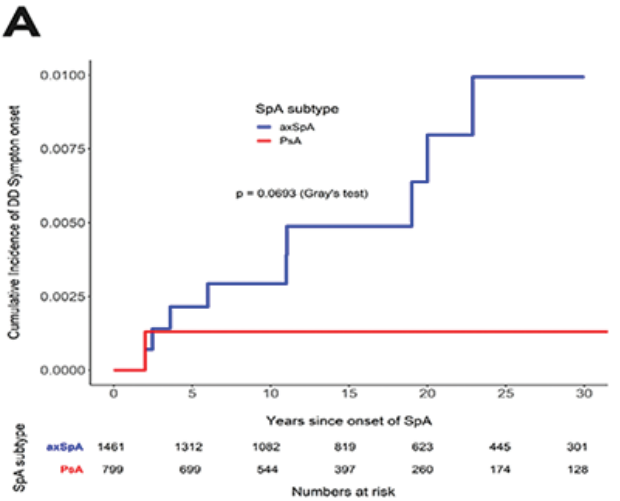

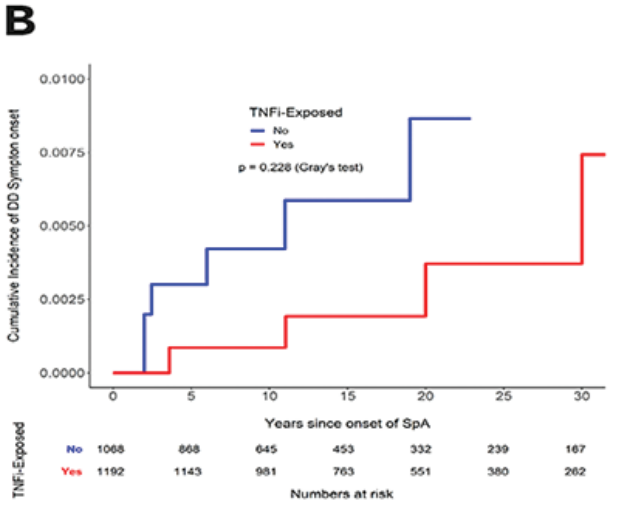

Table 1. Risk factors for demyelinating diseases among SpA patients

Variables	Univariable analysis		Multivariable analysis*	
	HR (95% CI)	*p* value	HR (95% CI)	*p* value
Male sex	0.381 (0.121, 1.207)	0.101	0.303 (0.091-1.007)	0.051
Age of SpA onset	1.004 (0.964, 1.045)	0.846		
SpA subtype				
axSpA	5.420 (0.709, 41.444)	0.103	6.661 (0.938, 47.298)	0.058
PsA	0.184 (0.024, 1.411)	0.103		
HLA-B27 positivity	0.649 (0.174, 2.429)	0.521		
Smoking	2.378 (0.721, 7.837)	0.155	3.377 (0.980-11.635)	0.054
Extraarticular manifestations				
Uveitis	2.416 (0.772, 7.566)	0.130		
Psoriasis	0.653 (0.197, 2.165)	0.486		
IBD	4.523 (1.334, 15.343)	0.015*	4.750 (1.264, 17.851)	0.021*
Family history				
SpA	0.393 (0.048, 3.212)	0.384		
IBD	1.641 (0.211, 12.772)	0.636		
History of TNFi use	0.500 (0.162, 1.549)	0.230	0.273 (0.082, 0.912)	0.035*

Objectives: Ankylosing spondylitis and psoriatic arthritis were seen to coexist with demyelinating diseases (DD), but it is unknown whether this is due to a common underlying pathological mechanism, the use of TNF inhibitors (TNFi), or mere coincidence. We aimed to investigate the incidence of DD among spondyloarthritis (SpA) patients and identified risk factors for DD.

Methods: Axial spondyloarthritis (axSpA, n = 1547) and psoriatic arthritis (PsA, n = 1377) patients were identified from a longitudinal observational cohort study database. Cumulative incidence rates (CIR) of DD were obtained with competing risk analysis using a method suggested by Pepe and Mori. Hazard ratios and 95% CI comparing patients with DD and without DD were estimated from Cox regression analyses using Fine and Grey's method.

Results: There were 19 patients (0.65%) with SpA and DD in our cohort of 2924 patients. The most common DD type was multiple sclerosis (n= 10). Patients with DD were more often smokers (72.2% vs 42.5%, $P = 0.0150$) and more likely to have inflammatory bowel disease (IBD; 31.6% vs 8%, $P = 0.0030$). Over 70 years, 2260 patients contributed follow-up data. Of these, we identified 12 (11 axSpA, 1 PsA) DD events corresponding to a CIR of 0.5%. Respective CIRs of DD at 5, 10, 15, and 20 years were higher in axSpA (0.2%, 0.3%, 0.5%, and 0.8%) than in PsA (0.1% across all years) but was not significant ($P = 0.069$) (Figure A). According to TNFi exposure, CIRs were higher in the TNFi-unexposed (0.3%, 0.4%, 0.6%, 0.9%) vs the TNFi-exposed (0.1%, 0.1%, 0.2%, 0.4%) but did not reach statistical significance ($P = 0.2285$) (Figure B). Median time in years from to onset of DD was 20.52 (3.60, 32.00) from the onset of SpA, and 2.72 (0.21-5.29) from the first TNFi treatment. The risk of developing DD was found to be significantly higher among SpA patients with IBD (HR 4.52, 95% CI 1.32-15.34, $P = 0.015$) (Table 1). Neither TNFi exposure nor SpA subtype was a significant risk factor for DD with our dataset.

Conclusion: The overall incidence of DD in this SpA cohort is low at 0.5% over 70 years of follow-up. SpA patients with DD were predominantly smokers and had a higher frequency of IBD. Incident DD was higher in axSpA groups and in patients who were not exposed to TNFi, but these did not reach statistical significance ($P = 0.174$). The presence of IBD was associated with a higher risk of DD in this patient population.

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Canadian Research Group of Rheumatology in Immuno-Oncology (CanRIO) – A Retrospective Chart Review Study of Adults With Inflammatory Arthritis Associated With Cancer Immunotherapies

Brooke Pollock (University of Toronto, Toronto); Alexandra Saltman (University of Toronto, Toronto); Megan Himmel (University of Toronto, Toronto)

Objectives: Cancer therapies that target immune checkpoints have a prominent role in the treatment of malignancy. Despite their effectiveness in generating anti-tumor responses, they can cause off-target immune-related adverse events (irAEs), sometimes resulting in de novo rheumatic diseases. While glucocorticoids are the mainstay of therapy for rheumatic irAEs, there is concern that their use may blunt the anti-tumor response and cause avoidable glucocorticoid-related side effects. However, there is little data on the differences in therapeutic approach and prescribing patterns to date. The purpose of this study was to describe glucocorticoid route and dosing, adverse event profile, and patient outcomes between patients initiated on glucocorticoids for rheumatic irAEs by oncologists vs rheumatologists.

Methods: This was a single-center retrospective chart review. Adult patients who received an immune checkpoint inhibitor and were identified as having inflammatory arthritis as a rheumatic irAE or those with pre-existing inflammatory arthritis were included. Patients were divided into two groups according to whether they were initiated on glucocorticoid therapy by Oncology vs Rheumatology. Glucocorticoid route of administration, dose, and adverse event profile were recorded. Patient-reported quality of life was captured via a standard Health Assessment Questionnaire (HAQ) that was completed at the time of initial assessment by Rheumatology and at 1 month follow-up.

Results: 86 patient charts were reviewed. Mean age was 65 years old. 57 patients received glucocorticoid therapy for inflammatory arthritis. 22 (40%) patients were initiated on glucocorticoid therapy by Oncology, and 34 (60%) patients were initiated on glucocorticoid therapy by Rheumatology. Of the patients started on glucocorticoid therapy by Oncology, 22 (100%) were initiated on oral prednisone alone. Of those started on glucocorticoid therapy by Rheumatology, 24 (70%) patients were initiated on prednisone monotherapy, and 9 (26%) patients received intra-articular glucocorticoids without systemic glucocorticoids. Of those initiated on oral glucocorticoids, the average starting dose by Rheumatology was 15 mg prednisone daily, while the average in Oncology was 47 mg prednisone daily ($P < 0.001$). 18 patients experienced adverse events to glucocorticoids. 4 (17%) patients initiated on glucocorticoids by Rheumatology experienced adverse events, compared with 14 (64%) of patients started on glucocorticoids by Oncology ($P < 0.001$).

Conclusion: Use of systemic glucocorticoids in the treatment of rheumatic irAEs is associated with glucocorticoid-related adverse events. When treated by Rheumatologists, patients receive lower doses of glucocorticoids with significantly fewer adverse events. This highlights the need for further education and collaboration between Rheumatology and Oncology to best manage this complex patient population.

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Development of Spondyloarthritis Following Treatment With an Immune Checkpoint Inhibitor in a Patient With Metastatic Melanoma: A Case Report

Eden Meisels (University of Toronto, Toronto); Justin Shapiro (University of Toronto, Toronto); Alexandra Saltman (University of Toronto, Toronto)

Background: Immune checkpoint inhibitors (ICIs) are a family of therapeutic agents used in cancer immunotherapy. They are monoclonal antibodies that bind to immune checkpoint receptors. They cause a robust anti-tumor response, and many off-target immune-related adverse events (irAEs) that affect nearly every organ system.[1,2]

Case: We report the case of a 72-year-old female with a past medical history of hypertension, hypothyroidism, and psoriasis, who was diagnosed with BRAF-positive metastatic melanoma. In January 2020, she was started on immunotherapy with Nivolumab, an anti-PD1 ICI. Treatment was complicated by hypothyroidism and a psoriasis flare. In late 2020, she developed pain, stiffness, and restricted cervical and lumbar range of motion. Bone scan and CT scans of her brain, chest, abdomen, and pelvis showed no new metastatic disease. She was prescribed a course of dexamethasone 4 mg daily, which improved her range of motion and pain. After a five-week taper, her symptoms recurred. MRI spine in March 2021 revealed a large focus of inflammation involving the left facet joints C2-C5 with extensive edema and no evidence of cord signal abnormalities. She was promptly referred to the Rheumatology Immuno-Oncology clinic. Her clinical and radiographic findings were most suggestive of inflammatory spondyloarthritis. Physical exam revealed reduced C-spine range of motion in flexion, extension, and lateral rotation. She had no peripheral synovitis or extra-articular features of disease. Laboratory investigations revealed the following values: hemoglobin: 107 g/L, Ca2+: 2.65 mmol/L, albumin: 42 g/L, ESR: 20 mm/hr, CRP: 36.8 mg/L, RF: 31 IU/mL. She was ANA- and HLA-B27-negative. Treatment was initiated with Naproxen 500 mg BID, along with pantoprazole 40 mg daily for GI protection. Upon follow-up in April 2021, her pain and range of motion had improved significantly. Repeat MRI spine in June 2021 was reassuring for the absence of focal metastatic deposits. However, she developed morning stiffness in her neck lasting up to 30 minutes, stress pain in her left sternocleidomastoid muscles with lateral rotation, and iritis. She was treated with infliximab in July 2021, with good response and no recurrence of malignancy on CT in September 2021.

Conclusion: This case contributes to growing evidence that irAEs can develop secondary to ICI treatment and highlights the potential role of immune checkpoints in the pathogenesis of spondyloarthritis. With increasing use of ICIs, more rheumatic irAEs will transpire. Prompt diagnosis, referral, treatment initiation, and interdisciplinary communication are critical to address the complications and toxicities of ICIs, and minimize their impact on patients. References: [1.] Calabrese L. Nat Rev Rheumatol 2018;14:569-79. [2.] Himmel M. CMAJ 2020;192:651.

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Efficacy of COVID-19 Vaccinations in Patients With Rheumatoid Arthritis (RA) and Systemic Sclerosis (SSc)

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Objectives: Patients with inflammatory-mediated diseases (IMID) present a unique challenge for COVID-19 vaccination campaigns as they are predisposed to increased infections and if under immunosuppression, decreased vaccine immunogenicity. While current data suggests that vaccines effectively protect against severe COVID infections in the general population, preliminary studies describe impaired immunogenicity in IMID. We evaluated the effectiveness of COVID-19 vaccines in terms of inducing an immune response and preventing COVID infections (including those requiring hospitalization) in RA and SSc.

Methods: Participants with RA enrolled between April 2021 to Sept. 2022 at the McMaster site for the Safety and Immunogenicity of COVID-19 vaccines in Systemic Immune-Mediated Inflammatory Diseases (SUCCEED) study site were assessed after their first and second vaccine dose. The same methodology was applied for patients with Systemic sclerosis (SSc). COVID-associated IgG antibodies were measured via kinetic ELISA on serum, and cut-offs for significant antibody titers were generated based on pre-pandemic seronegative samples. The anti-spike protein and anti-RBD IgG levels were used as markers of immunity while the anti-nucleocapsid antibodies were used with patient reports to indicate previous COVID infections. Data on hospitalizations was extracted from completed patient diaries and questionnaires on the SUCCEED REDCap database. Descriptive statistical analyses were applied.

Results: Of the 43 RA and 21 SSc participants included for analysis, 81.4% were female and 18.6% were male for RA while 95.2% were female and 4.8% were male for SSc. The average age was 59 (SD = 23) for RA and 57 (SD = 11) for SSc. Pfizer was the most common vaccine for both doses, and Pfizer-Pfizer was the most prevalent combination (65.1% of RA and 58.9% of SSc). At 2-4 weeks post-dose 2, 90.9% of RA patients and 40% of SSc patients met the threshold for sufficient anti-spike IgG antibody levels. By 3 months post-dose 2 however, 92.3% of SSc patients were above threshold. Of the Pfizer-Pfizer vaccine pairing, 78.6% of RA and 45.5% of SSc were above anti-spike antibody cut-offs at 3 months post-dose 2. Within the 3 months post dose 2, there were no hospitalizations of any cause and only 1 reported COVID infection in a RA patient who had Pfizer then Moderna.

Conclusion: SSc patients appear to be more delayed than RA patients in acquiring immunogenicity. Nevertheless, the rates of COVID infection and hospitalization were low for both groups. More data is needed on different vaccine pairings to determine if there are vaccine-specific patterns of immunogenicity.

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Multisystem Inflammatory Syndrome in Children: A Rare Case Requiring Venovenous Extracorporeal Membrane Oxygenation

Claire McNiven (The Stollery Children's Hospital/ University of Alberta, Edmonton); Daniah Basodan (The Stollery Children's Hospital/ University of Alberta, Edmonton)

Background: Multisystem Inflammatory Syndrome in Children (MIS-C) associated with SARS-CoV-2 can be a severe illness requiring life support in the form of extracorporeal membrane oxygenation (ECMO). There have been multiple cases and reviews describing children with MIS-C needing venoarterial ECMO (VA-ECMO) due to depressed cardiac function. Here we present a case of a child with MIS-C without myocardial dysfunction who required venovenous ECMO (VV-ECMO) for respiratory failure.

Case: Our patient, a previously healthy eight-year-old Caucasian female presented to the emergency department one month after a symptomatic COVID-19 infection in December 2021. She presented with abdominal pain, then developed headache, fever, lethargy, maculopapular rash, and periorbital edema. At the onset she had lymphopenia, thrombocytopenia, with significant inflammation: CRP 164, ferritin 341 and BNP at 2500 but normal troponin levels. As her clinical status worsened concern grew for MIS-C and she was admitted for intravenous immunoglobulin (IVIg), methylprednisolone, aspirin, and empiric antimicrobial therapy. She became hypotensive and was transferred to a tertiary center pediatric intensive care unit (PICU) for vasoactive support. Her steroids were escalated to pulse dosing for three doses, and she gradually improved over three days and weaned off vasoactive support. On the fourth day of PICU admission she unexpectedly deteriorated, with new respiratory distress and hemoptysis. The BNP level increased to 3000. Chest x-ray showed new bilateral infiltrates throughout with no pleural effusion. Significant pulmonary edema fluid was noted during intubation, and she required extremely high pressures to oxygenate and ventilate. She was emergently cannulated onto VV-ECMO. The pulse steroids were continued and high dose anakinra was started. Her lungs recovered and she was decannulated after two days. Cardiac MRI done the day after decannulation was normal, and BNP and troponin normalized quickly. She was discharged after two weeks in hospital, and gradually weaned off steroids and anakinra. She had multiple normal cardiac ultrasounds. Genetic work-up thus far has not identified any mutations associated with severe MIS-C (XIAP and CYBB). Our patient had a second COVID-19 infection six months later in the summer of 2021 with no associated MIS-C or hyperinflammation.

Conclusion: The etiology of the acute deterioration remains unclear, but in the context of a quick response to high dose anakinra and normal cardiac MRI and echocardiogram, the deterioration is thought to be secondary to flash pulmonary edema secondary to significant hyperinflammation associated with MIS-C.

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Macrophage Activation Syndrome in Juvenile Systemic Lupus Erythematosus: A Systematic Literature Review

Hannah Rosales (McMaster University, Hamilton); Daya Gill (McMaster University, Hamilton); Konstantinos Tselios (McMaster University, Hamilton)

Objectives: Macrophage activation syndrome (MAS) may occur in the context of systemic autoimmune diseases, such as juvenile idiopathic arthritis and systemic lupus erythematosus (SLE). Although rare, MAS is potentially life-threatening and prompt recognition/diagnosis is of paramount importance for favorable outcomes. Our objective was to systematically review the published data on MAS in children with SLE with emphasis on the clinical, laboratory and therapeutic variables.

Table 1. Main clinical, laboratory and therapeutic variables of all patients

Variable	N (%)	Notes
Fever	168/176 (95.5%)	Max temperature 40°C
Polyarthritis	70/109 (64.2%)	
Inflammatory rash	74/115 (64.3%)	Including malar rash
Oral/nasal ulcerations	54/106 (50.9%)	
Lymphadenopathy	41/108 (38%)	
Hepatomegaly	49/159 (30.8%)	
Splenomegaly	38/154 (24.7%)	
Renal impairment	69/132 (52.3%)	27 with lupus nephritis
Serositis	32/83 (38.6%)	
Encephalopathy/seizures	48/150 (32%)	
Hemorrhagic manifestations	26/103 (25.2%)	
Abdominal pain/vomiting	10/12 (83.3%)	
Pancreatitis	29/200 (14.5%)	
Anemia (Hb<12g/dL)	138/138 (100%)	Hemoglobin 84.9±15.2g/dL, range 49-114g/dL
Leukopenia (WBC<4000/µl)	113/133 (85%)	WBC 3800±2375/µl, range 1030-9800/µl
Neutropenia (NEU<1500/µl)	27/28 (96.4%)	Neutrophils 942±642/µl, range 330-2251/µl
Thrombocytopenia (PLT<150000/µl)	50/85 (58.8%)	PLT 104±62000/µl, range 8-300000/µl]
Alanine aminotransferase	179±136IU/L	range 15-458IU/L
Aspartate aminotransferase	506±613IU/L	range 23-2534IU/L
Albumin	23.7±6.5g/L	range 11-34g/L
ESR	60±28mm/hr	range 10-113mm/hr
C-reactive protein	17.9±22.4g/L	range 0.3-88g/L
Ferritin	10198±16445ng/ml	range 1146-73968ng/ml
Triglycerides	370±214mg/dl	range 54-1045mg/dl
Hemophagocytosis	36/92 (39.1%)	In bone marrow
SLEDAI-2K	30.6±12.9	
Antinuclear antibodies (ANA)	76/76 (100%)	range from 1:160 to 1:1280
C3	0.44±0.29g/L	range 0.16-1.11g/L
C4	0.1±0.06g/L	0.03-0.22g/L
Anti-dsDNA	154±163IU/ml	range 13-500IU/ml

Hb: hemoglobin, WBC: white blood cells, NEU: neutrophils, PLT: platelets, ESR: erythrocyte sedimentation rate, SLEDAI-2K: SLE Disease Activity Index-2000

Methods: We conducted a systematic literature review according to the PRISMA 2019 guidelines. PubMed database was searched to identify studies on children (< 18 years) with SLE who developed MAS. Medical Subject Headings (MeSH) terms included "lupus" AND "macrophage activation syndrome" OR "hemophagocytic lymphohistiocytosis." Studies on animals, pertaining solely to pathogenesis and published in a non-English language were excluded. Data were collected in a pre-established collection form to assist analysis; descriptive statistics were used.

Results: Of 109 articles retrieved, 34 were eligible for further analysis. Collectively, there were 200 patients (165 females). Mean age at onset was 12 ± 2.7 years (range 7-18). SLE predated MAS in 182 patients. Clinical and laboratory variables are shown in Table 1. Glucocorticoids were used in 167/180 (92.8%, methylprednisolone pulses 84/167, dexamethasone 13), intravenous immunoglobulins 74/180 (41.1%), cyclosporine 58/180 (32.2%), cyclophosphamide 28/180 (15.6%), etoposide 13/180 (7.2%), other immunosuppressives 27/180 (15%), plasma exchange 9/180 (5%). The mortality rate was 13.1% (22/168); main causes of death included sepsis in 13 patients, intracerebral hemorrhage in 2 and acute respiratory distress syndrome in one patient.

Conclusion: In the majority of juvenile SLE patients who develop MAS, their primary disease was severely active both clinically and serologically. Hemophagocytosis (the gold standard for diagnosis) was only present in 39% of the patients. Treatment consisted mainly of glucocorticoids and immunosuppressives or intravenous immunoglobulins. The mortality rate was 13%, underlining the need for prompt diagnosis and aggressive treatment.

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Recombinant Human Interleukin-2 for Systemic Lupus Erythematosus: A Systematic Literature Review

Daya Gill (McMaster University, Hamilton); Hannah Rosales (McMaster University, Hamilton); Konstantinos Tselios (McMaster University, Hamilton)

Objectives: The pathogenesis of systemic lupus erythematosus (SLE) involves multiple immunologic pathways leading to tissue damage. However, the breakdown of the peripheral immune tolerance seems to be the overarching event. In this context, quantitative and qualitative defects of the T regulatory cells (Tregs) have been described. Treatment with recombinant IL-2 aims to restore these defects and suppress virtually all the pathogenetic pathways in SLE. Our objective was to systematically review the published data on the safety and efficacy of IL-2 in SLE patients.

Methods: We conducted a systematic literature review according to the PRISMA 2019 guidelines. PubMed database was searched to identify studies on SLE patients who were treated with IL-2. Medical Subject Headings (MeSH) terms included "lupus" AND "IL-2" OR "interleukin-2." Studies on animals, pertaining solely to pathogenesis and published in a non-English language were excluded. The Newcastle-Ottawa scale was applied for quality assessment. Data were collected in a pre-established collection form to assist analysis; descriptive statistics were used.

Results: Of 51 articles retrieved, 8 were deemed to be eligible for further analysis including one randomized controlled trial. There were 202 patients in total (171 females, 84.7%), mean age 34.6 ± 3 years, mean SLEDAI-2K 11.3 ± 2.7, mean disease duration 6.7 ± 4 years. Main clinical manifestations included arthritis in 24/48 (50%), skin involvement 52/88 (59.1%), oronasal ulcerations 9/87 (10.3%), inflammatory alopecia 33/87 (37.9%), myositis 4/48 (8.3%), active lupus nephritis 13/202 (6.4%), vasculitis 8/47 (17%), leukopenia 19/40 (47.5%) and fever 3/30 (10%). Mean C3 levels were 0.71 ± 0.17 g/L, C4 0.14 ± 0.06 g/L and anti-dsDNA titers 129 ± 143 IU/ml. Therapeutic variables and outcomes are shown in Table 1. Adverse events included infections in 4/89 patients (4.5%, no serious infections), injection site reactions in 22/89 (24.7%) and fever with flu-like syndrome in 14/89 (15.7%).

Conclusion: IL-2 therapy restores the numbers of peripheral Tregs and exerts a beneficial effect in the majority of SLE patients with refractory musculoskeletal and mucocutaneous manifestations. Its safety profile is acceptable and should be further trialed in SLE.

Table 1. Therapeutic variables and outcomes

Variable	N (%)	Notes
Recombinant IL-2 dose	1x10^6 IU (n=184) 1.5-4.5x10^6 IU (n=18)	Every other day for 2 weeks (134/202, 66.3%)
Glucocorticoids	137/152 (90.1%)	Mean prednisone dose 20.2±8.3mg/day
Antimalarials	114/152 (75%)	
Methotrexate	1/30 (3.3%)	
Azathioprine	10/146 (6.8%)	
Mycophenolate mofetil	45/146 (30.8%)	
Cyclophosphamide	15/134 (11.2%)	
Leflunomide	5/104 (4.8%)	
End-points		
SLEDAI-2K improvement	151/179 (84.4%)	Mean decrease by 6 points
Arthritis resolution	16/22 (72.7%)	
Skin involvement resolution	36/47 (76.6%)	
Alopecia resolution	22/31 (71%)	
Oronasal ulcerations	7/8 (87.5%)	
Lupus nephritis	10/13 (76.9%)	Partial or complete remission
Tregs	38-78% increase	2-12 weeks after treatment initiation

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Does Early Complete Remission Preclude Adverse Outcomes in Lupus Nephritis?

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Objectives: Early complete remission (within 12 months) is considered an important protective factor against development of advanced chronic kidney disease (CKD) in lupus nephritis (LN). However, a certain proportion of such patients still develop advanced CKD and, eventually, end-stage renal disease (ESRD). Objective of this study was to describe the factors associated with the development of advanced CKD (stage IV or worse) in patients with LN who achieved early complete remission.

Methods: Patients with LN based on biopsy or abnormal proteinuria (> 0.5 g/day) and/or hematuria or pyuria or casts for two consecutive visits in the absence of any other plausible explanation were retrieved from the Toronto Lupus Clinic longitudinal database. Individuals with advanced CKD at baseline (eGFR ≤ 29 ml/min/1.73 m^2) were excluded. All patients achieved complete remission (proteinuria < 0.5 g/24 h, inactive urinary sediment and serum creatinine < 120% of baseline) within 12 months. Flare was defined as any abnormal proteinuria (> 0.5 g/day) or increase in serum creatinine (SCR) from normal to abnormal or > 120% of baseline after remission plus treatment escalation (glucocorticoids and/or immunosuppressives).

Results: Of 273 eligible patients achieving remission within the first year, 21 (7.7%) developed advanced CKD after a median of 5.8 years from the time of remission (range 0.7-31.7 years). The baseline characteristics are shown in Table 1. Multivariate survival analysis showed disease duration at LN onset, baseline SCR (HR = 1.03, 95% CI 1.02-1.04, $P < 0.001$), low complement C3 at baseline (HR = 4.14, 95% CI 1.53-11.26, $P = 0.005$) and one or more flares during the first 5 years of LN (HR = 4.53, 95% CI 1.47-13.92, $P = 0.008$) to independently predict advanced CKD. We further divided the 21 patients who developed advanced CKD according to the median time (5.8 years). Early progressors were older, had lower eGFR, lower SLEDAI-2K and were more often treated with antihypertensives compared to the late progressors. The major factors leading to early CKD were poor compliance or insufficient therapy due to concomitant infections in 7 and moderate-to-severe interstitial fibrosis and tubular atrophy (IFTA) in 4 patients. In late progressors, compliance was poor in 2 patients, moderate-to-severe IFTA was present in 3, poorly controlled hypertension in 2, thrombotic microangiopathy in one, refractory disease in one while one patient progressed over 32 years.

Conclusion: Patients with impaired kidney function and low complement C3 at baseline, as well as histopathologic features of chronic irreversible damage (interstitial fibrosis/tubular atrophy), are at risk for CKD despite early remission and should be followed closely. The importance of maintenance therapy should be communicated to the patients to prevent non-compliance and subsequent flares.

Table 1. Baseline Characteristics

VARIABLE	No CKD4 or worse (N=252)	CKD4 or worse (N=21)	*P*
Females	213 (84.5%)	15 (71.4%)	0.12
Age	35.4 ± 12.8	34.3 ± 14.6	0.703
SLE duration (median)	2 (0-7)	2 (0-11)	0.636
Ethnicity			
Blacks	33 (13.1%)	4 (19%)	0.444
Caucasians	169 (67.1%)	12 (54.1%)	0.356
Asians	50 (19.8%)	5 (23.8%)	0.574
Hypertension (SBP≧130 or DBP≧80 or on anti-hypertensives)	184 (73.0%)	17 (81%)	0.428
Diabetes	10 (4.0%)	0 (0.0%)	0.352
Total cholesterol (mmol/l)	5.9 ± 1.7	5.7 ± 1.3	0.511
SLEDAI-2K	10.7 ± 8.1	9.6 ± 7.2	0.562
SDI	0.3 ± 0.8	0.8 ± 1.5	0.016
SCR (µmol/l)	80.7 ± 25.8	124.9 ± 71.9	<.001
Abnormal SCR	36 (14.3%)	10 (47.6%)	<.001
eGFR (ml/min/1.73 m2)	89.9 ± 28.4	76.7 ± 45.7	0.054
Low Complements	136 (54.0%)	16 (76.2%)	0.049
Elevated dsDNA	143 (56.7%)	15 (71.4%)	0.19
Glucocorticoids	214 (84.9%)	19 (90.5%)	0.489
Prednisone dose (mg/day)	32.1 ± 19.7	30.9 ± 19.7	0.803
Variables after baseline			
Duration of immunosuppressives from remission to outcome/last date	4.9 ± 6.0	4.4 ± 4.9	0.698
Flares ≥1	41 (16.3%)	14 (66.7%)	0.048

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Mesangial Lupus Nephritis: Long-Term Outcomes

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Objectives: Mesangial lupus nephritis (LN II) is considered benign with minimal potential for developing advanced chronic kidney disease (CKD). However, a certain proportion of such patients still develop advanced CKD and, eventually, end-stage renal disease (ESRD). Our objective was to describe the factors associated with the development of advanced CKD (stage IV or worse) in mesangial LN.

Methods: Patients with mesangial LN based on kidney biopsy that was performed at or after enrollment to the clinic and at least 1 year of follow-up were retrieved from the Toronto Lupus Clinic longitudinal database. Biopsy was performed because of proteinuria (n = 55), rising serum creatinine without proteinuria or active urinary sediment (n = 24), active urinary sediment (n = 6) and generalized lupus activity (n = 6). Patients with ESRD at baseline were excluded. Individuals were followed over time for the development of advanced CKD.

Results: Of 91 eligible patients, 10 developed advanced CKD during follow-up, 7 (7.7%) CKD stage IV and 3 (3.3%) ESRD. Statistically significant differences in baseline characteristics are shown in Table 1. In 81/91 patients (89%), there was no significant deterioration of renal function after 16.8 ± 12.8 years. Proteinuria was mild (1.17 ± 0.89 g, range 0.5-5 g/day). Fifteen patients had a repeat biopsy; histologic transformation was demonstrated in 10 (7 with proliferative nephritis, 2 with membranous and 1 with advanced glomerulosclerosis). Sixty-three patients (67.7%) had normal renal function while 18 (19.4%) had CKD stage III at last visit. Seven patients developed CKD IV of whom 4 already had impaired kidney function at baseline whereas their proteinuria was mild (< 1 g/day). Four patients had a repeat biopsy; 2 developed membranous nephropathy while there were no changes in the other two. Despite their advanced disease, their renal function remained stable (eGFR = 24.2 ± 4.3 mL/min/1.73 m^2) after a mean of 18.5 ± 8.5 years. Three patients developed ESRD, all of whom had impaired kidney function at baseline (stage IV). Despite their advanced CKD, these patients developed ESRD after 8.6, 10.3 and 16.8 years respectively. Two of them had a repeat kidney biopsy showing histologic transformation (one proliferative nephritis and one advanced glomerulosclerosis).

Conclusion: Advanced CKD (stage IV or worse) developed in 11% of patients with mesangial LN but the progression was slow. In most cases, kidney function was already impaired at the time of the biopsy, while proteinuria was only mild. These findings imply that mesangial disease can

Table 1. Baseline characteristics of the patients (only variables showing a statistically significant difference are shown)

VARIABLE	Patients who developed CKD stage IV or worse (n=10)	Patients who did not progress (n=81)	*p*
SDI	1.3 ± 1.9	0.3 ± 0.7	<0.001
SCR (µmol/l)	209.2 ± 127.2	92 ± 32	<0.001
eGFR (ml/min/1.73 m2)	45.2 ± 43.1	76.7 ± 23.7	<0.001
Abnormal SCR	8 (80.0%)	13 (16%)	<0.001
Elevated dsDNA	2 (20.0%)	48 (59.3%)	0.019
Chronicity Index	2.2 ± 2.6	0.9 ± 1.6	0.028
Interstitial fibrosis (moderate-to-severe)	3 (30%)	3 (3.7%)	0.009
Tubular atrophy (moderate-to-severe)	3 (30.0%)	4 (4.9%)	0.014

occasionally lead to CKD and underlines the need for close monitoring of such patients with treatment that should not be based on proteinuria alone.

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Impact of Time to Remission, Flares and Exposure to Immunosuppressives on the Development of Advanced Chronic Kidney Disease (Stage IV or Worse) in Lupus Nephritis

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Objectives: Lupus nephritis (LN) affects up to 40% of patients with SLE and leads to end-stage kidney disease (ESKD) in 17-33% after 10 years. The prevalence of chronic kidney disease stage IV is not known; however, approximately two-thirds of such patients will progress to ESKD after 6 years on average.[1] Our objective was to determine the impact of time to remission and flares on the development of advanced CKD (stage IV or worse) in LN.

Methods: Patients with LN based on biopsy or abnormal proteinuria (> 0.5 g/day) with or without hematuria/pyuria/casts for two consecutive visits in the absence of other plausible explanation were retrieved from the Toronto Lupus Clinic database. Individuals with advanced CKD at baseline were excluded. All patients were followed for at least 5 years. The primary outcome was the development of advanced CKD (eGFR ≤ 29 mL/min/1.73 m^2). Remission was defined as proteinuria < 0.5 g/24h, no active urinary sediment and serum creatinine < 120% of baseline. Flare was defined as any abnormal proteinuria (> 0.5 g/day) after remission. Death was treated as competing risk in survival analysis.

Results: Out of 418 eligible patients, 209 (50%) achieved remission within the first year, 102 (24.4%) within the 2nd and 3rd years, 70 (16.7%) after 3 years and 37 (8.9%) never achieved remission. Sixty-six patients (15.8%) developed advanced CKD after 9.5 years on average (37 with ESKD). At baseline, these patients had a higher SLICC/Damage Index (0.6 ± 1.2 vs 0.3 ± 0.7, $P = 0.003$), lower eGFR (73 ± 38 vs 94 ± 33 mL/min/1.73 m^2, $P < 0.001$), higher prevalence of hypertension (85% vs 73%, $P = 0.046$), proliferative nephritis (combined class III and IV, 66% vs 47.8%, $P = 0.017$) and more often treated with ACE inhibitors or angiotensin receptor blockers (35% vs 22%, $P = 0.02$). Remission rates, flares and exposure to immunosuppressives after remission are shown in Figure 1. Patients who achieved remission within one year demonstrated better outcomes compared to all other groups ($P < 0.0001$) (Figure 1). Patients with complete remission between one and three years had similar outcomes for the first 10 years and deteriorated during the second decade of follow-up.

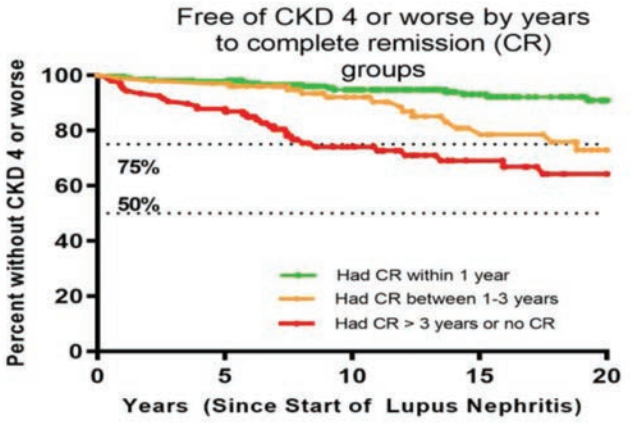

Table 1.
A. Time to remission, exposure to immunosuppressives and flares in all patients

VARIABLE		Advanced CKD (n=66)	No advanced CKD (n=352)	p
Years from LN to complete remission		3.0 ± 3.4	1.6 ± 2.1	<0.001
Years on Immunosuppressives from complete remission to outcome/last date (median)		2 (0-7)	4 (0-8)	0.008
Number of flares in first five years after LN	0	12 (18.2%)	156 (44.3%)	<0.001
	1	14 (21.2%)	79 (22.4%)	
	2 or more	40 (60.6%)	117 (33.2%)	
B. Multivariate analysis for the outcome of advanced CKD (stage IV or worse)				
		HR	95%CI	p
Serum creatinine at baseline		1.02	1.01-1.02	<0.0001
Complete remission between 1-3 years (compared to remission within 1 year)		2.48	1.14-5.37	0.022
Complete remission after 3 years or no remission (compared to remission within 1 year)		2.99	1.41-6.34	0.004
Years on Immunosuppressives from complete remission to outcome/last date		0.89	0.83-0.95	<0.0001
One flare (compared to no flares)		2.68	1.05-6.86	0.04
Two or more flares (compared to no flares)		3.55	1.51-8.34	0.004

Conclusion: Complete remission within the 1st year from diagnosis strongly protects against advanced CKD. Flares significantly affect prognosis. One flare was associated with 2.7-fold increased risk for advanced CKD (3.6-fold for 2 or more flares). Longer time on immunosuppressives after remission decreases the risk for advanced CKD. Our findings emphasize the importance of early remission as well as flare prevention with prolonged immunosuppressive use to maximize renal survival in LN. References: [1.] Tselios K. J Rheumatol 2020:47(9):1366-1373.

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Disparity in Healthcare in Systemic Lupus Erythematosus: A Single-Center Study

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Objectives: Systemic lupus erythematosus (SLE) is an autoimmune condition with variable presentation and fluctuating disease severity. Health outcomes in SLE have been linked to both genetic and social factors related to differences in gender, ethnicity, education, income, and occupation. This cross-sectional study aims to evaluate the relationship between the access to primary care, social determinants of health (SDH), and disease outcomes in the Ottawa SLE Registry (OSLER).

Methods: Patients with a 2019 EULAR/ACR SLE diagnosis were recruited consecutively and informed consent was obtained. Information on patient demographics, SDH and quality of life (Lupus QoL) was collected through a Patient Questionnaire. A chart review was conducted to document disease activity by SLE Disease Activity Index (SLEDAI-2k) at the consenting visit, emergency department visits, ACR damage index and select adverse outcomes.

Results: 41 adult patients with SLE were recruited to date. The mean age was 54.51 ± 13.07 years and female patients made up 87.6% of the participants. The majority are Caucasian (58%), and 17% Black, 10% First Nations, and 10% of Asian descent. Participants did not have differing gender identities as compared to their gender at birth. 95% of participants were heterosexuals. 44% were employed, 29% retired, 19.5% were on disability and 7.3% were unemployed. 39% were rural residents. 92.7% had access to primary care (PC group) and 7.3% did not currently have access to primary care (NPC group). The NPC group had a mean SLEDAI-2K score of 3.00 ± 1.73, which was numerically higher, but statistically insignificant as compared to the mean score of 2.71 ± 4.44 in the PC group. The ACR damage index score was 1.33 ± 1.89 in NPC group and 1.68 ± 2.40 in PC group. 15.8% of the PC group had lupus-related pregnancy complications, however 33.3% of the NPC group had pregnancy complications. NPC group had LupusQoL questionnaire score of 69.03 ± 19.15, whereas the PC group had a score of 69.39 ± 21.84. No statistically significant difference was found in the number of visits to emergency department in 2021-2022, between NPC group and PC group.

Conclusion: At this stage, we have described the social determinants of health within the OLSER cohort. Our preliminary results suggest SLE patients without access to primary care may have an increased risk of pregnancy complications, but the sample size is small, and the study is ongoing. Further multivariate analysis is planned.

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Occupation as a Gendered-Role and Outcome in Systemic Sclerosis

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Objectives: Sex and gender differences in disease onset and course are of growing scientific interest. While sex differences have been shown to exist in systemic sclerosis (SSc), there is a paucity of data on gender-related factors. Our objective was to examine the association between occupation, a gender-related role, and various outcomes in SSc.

Methods: Data were extracted from the Canadian Scleroderma Research Group registry. An occupation score was constructed using the National Occupational Classification (NOC) 2016 and data collected by Statistics Canada. The proportion of women in the general population in each of the 47 specific occupations in the NOC was calculated (possible range from 0 to 100%); the lower the proportion, the more traditionally held by men and the higher the proportion, the more traditionally held by women the occupation was considered. Each patient was then assigned an occupation score ranging from 0 to 100 based on their self-reported occupation. We examined the associations between occupation score and various clinical outcomes. Multivariate models, adjusted for sex, age, smoking and education were used to estimate the independent effect of occupation score on SSc.

Table 1 Associations between occupation score and SSc outcomes, adjusted for sex, age, smoking and education

	SSc manifestations, OR (95% CI)		
	Diffuse vs limited	ILD (yes vs no)	PH (yes vs no)
Occupation score	1.002 (0.997, 1.008)	1.004 (0.998, 1.010)	1.010 (0.998, 1.022)
	Pain (range 0-10), β (se) p value		
Occupation score	-0.004 (0.004) p=0.234		
	Response to treatment (CRISS improved vs not improved), OR (95% CI)		
Occupation score	0.993 (0.980, 1.007)		
	Mortality, HR (95% CI)		
Occupation score	0.999 (0.992, 1.006)		

CI: confidence interval; CRISS: Combined Response Index for Systemic Sclerosis; HR: hazard ratio; ILD: interstitial lung disease; OR: odds ratio; PH: pulmonary hypertension; se: standard error; SSc: systemic sclerosis

Results: We included 1104 subjects, of which 961 were females (87%) and 143 (13%) males. There were differences between females vs males: disease duration (9.9 vs 7.6 years, P = 0.002), diffuse disease (35% vs 54%, P < 0.001), interstitial lung disease (ILD; 28% vs 37%, P = 0.021), and pulmonary hypertension (PH; 10% vs 4%, P = 0.033), but not pain, response to treatment and mortality. The median occupation scores differed between females and males (84.3 [IQR 56.8-89.4] vs 24.9 [4.3-54.1], P < 0.001). Spearman correlation between sex and occupation score was 0.44, indicating a weak correlation. In adjusted analyses, occupation score was not an independent predictor of disease subset (diffuse vs limited), ILD, PH, pain, response to treatment or mortality (Table 1).

Conclusion: We did not find independent associations between an occupation score, a gender-related role, and various outcomes in SSc. These results should be interpreted with caution as occupation may be a poor measure of gender. Future research using a validated measure of gender will be needed to generate robust data on the effect of gender in SSc.

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Mitochondrial Dysregulation in Fatigued Systemic Sclerosis and MPO-ANCA Associated Vasculitis Patients

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Objectives: Systemic Sclerosis (SSc) and MPO-ANCA associated vasculitis (MPO-AAV) patients often suffer from fatigue reminiscent of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). Studies have suggested that ME/CFS patients have an altered metabolic profile. In the current study, we evaluated the expression of various mitochondrial and metabolic genes, and looked at markers of cellular death, as possible biomarkers for fatigue in these patients.

Methods: Mitochondrial (Dloop, ND4, CyB, Cox7C) and metabolic (PDK1, PDK2, VEGFA) gene expression was assessed through qPCR. Cell free mitochondrial DNA integrity, defined as the ratio of small to large 16S-RNA fragments, was determined by qPCR. Results were normalized to GAPDH. This small-scale study included 10 healthy controls, 10 fatigued SSc patients, 10 non-fatigued SSc patients and nine fatigued MPO-AAV patients. The Canadian consensus criteria were used for ME/CFS diagnosis. The level of fatigue was assessed using the Multi-Dimensional Fatigue Inventory (MFI) and the Functional Assessment of Chronic Illness Therapy - Fatigue (FACIT-F) questionnaires.

Results: Compared to healthy controls, expression of mitochondrial ND4 (0.442 [0.10]) and CyB (0.385 [0.08]) was reduced in both fatigued SSc (0.105 [0.21], $P \leq 0.002$; 0.110 [0.23], $P = 0.006$) and fatigued MPO-AAV (0.265 [0.24], $P = 0.02$; 0.233 [0.18], $P \leq 0.001$) patients. Analysis of metabolic genes found fatigued SSc patients (-1.52 [0.18]) had lower expression of PDK1 than healthy controls (-1.35 [0.0129]; $P = 0.01$). A significant trend was also observed for the expression of both PDK1 and PDK2 in fatigued MPO-AAV patients (-1.54 [0.19]); -2.393 [0.379]), where expression was lower than in healthy controls (-1.35 [0.12]; $P = 0.05$) and (-2.19 [0.26]; $P = 0.05$). mtDNA integrity indicated that fatigued MPO-AAV patients have a more necrotic profile (1.08 [0.03]) than healthy controls (1.00 [0.04], $P = 0.002$). There was no difference in mtDNA integrity between fatigued SSc patients and healthy controls. Pairwise correlations were carried out for the SSc group (n = 20), where PDK1 expression was shown to be correlated with the expression of both ND4 ($P = 0.009$) and CyB ($P = 0.004$). ND4 and CyB expression correlated with FACIT-F scores, $P = 0.004$ and $P = 0.02$, respectively.

Conclusion: A large proportion of rheumatology patients suffer from comorbid ME/CFS. We have shown that there is evidence of both mitochondrial dysregulation in these patients. Further prospective and functional studies are needed to determine if this altered signature can be employed as a potential biomarker to better identify these patients. Our findings may help guide the design of future clinical interventions for various groups of rheumatology patients suffering from ME/CFS. Funding: Dutch Kidney Foundation (17PhD01) and Arthritis Society (19-0558)

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Mönckeberg Medial Calcific Sclerosis: A Rare Mimic of Giant Cell Arteritis

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Background: Mönckeberg medial calcific sclerosis (MCS) is a type of arteriosclerosis that affects the tunica media of small and medium-sized arteries. It is the most common form of medial calcification and is associated with increasing age, osteoporosis, diabetes and chronic kidney disease. Rarely, it can involve the temporal artery and mimic giant cell arteritis (GCA). Only three cases have been reported in the literature of suspected GCA found to be MCS after temporal artery biopsy (TAB).

Case: We present a 76-year-old female with a history of diffuse large B-cell lymphoma treated with R-CHOP, colonic adenocarcinoma treated with hemicolectomy, type 2 diabetes, hypertension and long-standing rotator cuff pathology. She presented with headache, temporal artery tenderness, jaw claudication, 1 year of blurry vision, new visual "silver spots," and worsening chronic shoulder pain. Investigations included an elevated ESR (64 mm/hr), elevated CRP (27.8 mg/L) and mild leukocytosis (10.2 × 10^9/L). She was empirically treated with 50 mg of prednisone daily prior to admission and referred to rheumatology for diagnosis and management, after which prednisone was increased to 60 mg daily

(Weight = 83 kg). Physical exam revealed normal radial pulses, but decreased carotid, brachial and dorsalis pedis pulses bilaterally. There was no temporal artery prominence, beading, pulselessness or tenderness. Shoulder exam was consistent with rotator cuff tendinopathy. TAB performed after 4 days of prednisone 60 mg/day reported no features of GCA but dystrophic calcification between the internal elastic lamina and the tunica media, compatible with MCS. Given her previous history of diffuse large B-cell lymphoma, she was referred to ENT; their assessment is pending. Prednisone was subsequently discontinued and after one month, her symptoms did not recur.

Conclusion: MCS is an important mimicker of GCA that rheumatologists should consider and quickly identify in order to minimize unnecessary exposure to glucocorticoid. Management of MCS is conservative and involves symptom control with analgesics.

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The Tongue-Tale Sign of Granulomatosis With Polyangiitis – A Clinical Pearl

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Background: Granulomatosis with polyangiitis (GPA) can be a diagnostic challenge that presents with a constellation of non-specific symptoms. Oral lesions are reported in 6-13% of GPA cases and, while often considered a non-specific finding in many diseases, the specific location of the ulcer can provide an important clue in diagnosing vasculitis. Here, we report a case of GPA presenting with a classic lateral mid-tongue ulcer.

Case: A 26-year-old female presented to hospital with fatigue, progressive dyspnea, fevers, and a worsening oral ulcer over the past week. Two weeks prior, she had recovered from COVID-19. She had recently started sulfasalazine for a possible diagnosis of peripheral spondyloarthropathy with features of inflammatory polyarthritis and iritis. Physical examination showed a lateral mid-tongue ulcerated lesion (Figure 1), nasal crusting, bi-basilar crackles, and violaceous papules affecting bilateral elbow extensor surfaces. There were no tender or swollen joints nor lymphadenopathy. Initial workup revealed a hemoglobin of 60 g/L, mild eosinophilia of 1.4 × 10^9/L, creatinine of 152 µmol/L (previously normal), urinalysis with microscopy positive for blood and protein, C-reactive protein of 166 mg/L and chest x-ray showed bilateral diffuse, patchy infiltrates. A differential diagnosis of infection, hypersensitivity drug reaction from sulfasalazine, and various autoimmune diseases was considered. The suspected pulmonary renal syndrome, nasal crusting, and location of her tongue ulcer raised concern for GPA. Further investigations showed no evidence of bacterial or viral infections. Testing for proteinase 3-ANCA was strongly positive (> 8.0 IU, upper limit of normal 1.0) and remaining serology including ANA was negative. Bronchoscopy revealed diffuse alveolar hemorrhage. On day 3 of admission, she developed new epistaxis. Skin biopsy demonstrated leukocytoclastic vasculitis. Based on these findings, the diagnosis of GPA was confirmed, and she was started on high dose glucocorticoids and rituximab. She was discharged after 17 days with minimal symptoms and stabilized creatinine. On follow up, there was no clinical or biochemical evidence of disease activity, including resolution of her tongue ulcer and rash.

Figure 1. Lateral mid-tongue ulcerated lesion

Conclusion: This presentation of multisystem disease pointed toward an autoimmune etiology. However, the lateral mid-tongue ulcer is a finding characteristic of vasculitis, such as giant cell arteritis and GPA, and was an important diagnostic clue that informed an early diagnosis of GPA. These findings reinforce a careful history and physical examination remain the cornerstone of diagnosing multisystem autoimmune diseases.

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The Utility of 18F-FDG-PET/CT in Assessing Disease Activity in Giant Cell Arteritis

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Objectives: 18F-FDG positron emission tomography (PET/CT) is sensitive and specific for diagnosing giant cell arteritis (GCA), but its role in following patients on treatment is less clear. Our study evaluated PET/CT in assessing clinical disease activity in patients with GCA while on treatment.

Methods: A retrospective chart review of patients diagnosed with GCA at the University of Alberta Hospital, Edmonton, Alberta who had undergone at least 2 PET scans > 3 months apart was performed. Clinical data was recorded. PET/CT images were re-reviewed by a blinded Nuclear Medicine radiologist. Vascular uptake was scored 0 to 3 compared to the liver in 7 territories. Total vascular scores (TVS) were calculated (0-21). Scans with vessel > grade 2 uptake were considered active. CRP > 10 was considered active.

Results: We identified 10 patients diagnosed with GCA who underwent 27 PET/CTs over a median of 38.3 months (range 12-72) See Table 1 for baseline demographics. At time of 27 PET/CT scans, 18 patients were clinically active and 9 were in clinical remission. In 17/27 (63%) cases, PET/CT activity agreed with clinical disease activity (in 16/17 cases both deemed active, and 1/17 both quiet). In the 10 (37%) discordant cases, PET/CT was active despite clinical remission in 8 and was normal despite clinical activity in 2. Following TVS over time, clinical disease activity and PET/CT uptake trended together in 12 of the 17 (70.6%) follow up scans (5 cases both improved, 6 cases both worsened, 1 case both stable), while in 5 scans there was discordance (2 cases clinical activity improved/TVS worsened, and 3 cases clinical activity worsened/TVS improved). For comparison, CRP agreed with

Table 1. Baseline demographics of included GCA patients.

	Age (years)	Sex	Number of PET/CTs performed	Months Between First and Last PET/CT	DMARD	Prednisone (yes/no)
Patient 1	74	Male	4	57	Methotrexate, tocilizumab	Yes
Patient 2	75	Female	2	19	Tocilizumab	Yes
Patient 3	76	Female	2	10	Tocilizumab	Yes
Patient 4	56	Female	2	6	Tocilizumab	Yes
Patient 5	65	Male	3	48	Methotrexate	Yes
Patient 6	74	Female	2	36	None	Yes
Patient 7	80	Male	5	18	Tocilizumab, methotrexate	Yes
Patient 8	76	Male	2	20	Tocilizumab	Yes
Patient 9	63	Male	3	32	Methotrexate, tocilizumab	Yes
Patient 10	72	Female	2	6	Tocilizumab	Yes

clinical disease activity in 16 of 27 cases (59.3%) and was discordant in 11 (10 cases CRP normal despite clinical activity, 1 case CRP elevated despite quiescent disease). Of 18 the patients with clinically active disease, 6 patients had both active CRP and PET/CT, but in 10 only PET was active, and in 2 only CRP was elevated. In no cases were neither CRP nor PET/CT positive. Of the 9 patients with clinically quiescent disease, CRP was negative in 8 cases and PET/CT was normal in one case. In no cases were neither CRP nor PET/CT normal.

Conclusion: FDG PET/CT total vascular scores trended with clinical disease activity in the majority (70%) of follow up cases and provided complimentary information to CRP. Additional scans in patients in remission are needed.

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Exercise and Physical Activity Interventions for Pediatric Rheumatic Diseases: A Scoping Review

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Objectives: Previous studies have reported impaired physical fitness in children with pediatric rheumatic diseases (PRDs). Exercise prescription and physical activity promotion may have an important role to play in disease management. Several systematic reviews of exercise therapy trials in children and adolescents with PRDs have been conducted. Conclusions on efficacy from these reviews, however, have been challenging due to the substantial heterogeneity in exercise interventions and reported outcome measures. The objective of this scoping review is to summarize the variety of interventions and outcomes that have been done to date to facilitate the development of core exercise study outcome sets for PRDs. This scoping review focused on four PRDs: Juvenile idiopathic arthritis (JIA), juvenile dermatomyositis (JDM), juvenile systemic lupus erythematosus (JSLE), and juvenile fibromyalgia (JFM).

Methods: A search of literature was conducted with a research librarian using the following electronic databases: MEDLINE, Embase, SPORT Discus, CINAHL, Cochrane Library, and PsycINFO. Published peer-review journal articles were included if they had an exercise or physical activity intervention, if they studied the intervention in participants < 18 years of age with a diagnosis of JIA, JDM, JSLE, or JFM, and if the article was written in English. Study screening and selection were performed independently by two reviewers (YKL and KMS). Data extraction was performed by one reviewer (YKL) and checked by a second reviewer (KMS). Disagreements were resolved by discussion or with a third reviewer (BMF).

Results: This scoping review yielded 67 published research papers, which reported 60 unique trials. Interventional study designs included randomized controlled trials, pre-post studies, crossover trials, and non-randomized trials. There was substantial heterogeneity in intervention purpose, intervention components, and outcome measures among the trials. Most studies were conducted on patients with JIA. Exercise training regimens varied across studies. Several studies examined the effects of specific forms of exercises such as Yoga, Pilates, Cardio-karate, Qigong, and water-based exercises. Outcome measures and measurement tools also varied but pain and physical function were the two most commonly measured outcomes. No study reported significant disease activity exacerbation or persistent discomfort resulting from exercise or physical activity intervention.

Conclusion: Future studies should focus on developing a core exercise study outcome set so that meta-analysis can be conducted to quantify the degree of benefit from physical activity. A coordinated effort by the research community to replicate interventional designs and improve the quality of reporting is needed to develop evidence-based exercise guidelines for this clinical population.

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Quality Assessment of Online Self-Management Resources for People With Osteoarthritis

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Objectives: The majority of osteoarthritis (OA) patients do not use self-management tools in their disease control plans, stating access to information about them as barriers. Self-management incorporates disease education, symptom control, and skill-building. While previous studies have analyzed online OA programs, their search protocols are not representative of actual internet search customs. We developed a wide-scale, multi-search engine inventory of online OA self-management resources and assessed each resource's quality, understandability, actionability, accessibility, and transparency, while maintaining the integrity of an internet user's typical behavior.

Methods: Three search entries ("osteoarthritis self-management," "how to manage osteoarthritis," and "treatment of osteoarthritis") were conducted on Google, Yahoo, Bing, and DuckDuckGo. Private browsing isolated searches from the researcher's browsing history, cookies, and cache. To recreate realistic search patterns, we indexed only the first page of results from each engine. Programs were assessed using the DISCERN, PEMAT, SMOG and FOG tools, and were deemed transparent if they provided references and disclaimers for third-party affiliations.

Results: The searches yielded 110 results, of which 12 remained after inclusion and exclusion criteria. The mean DISCERN score (M = 4.22) equates to high quality, the PEMAT scores for understandability and actionability were 85% and 58%, and the SMOG (M = 9.33) and FOG (M = 12.5) scores indicate difficult reading levels. All programs met transparency criteria. Results are shown in Table 1.

Conclusion: Online resources for OA self-management achieved good DISCERN and PEMAT scores. These results contrast with those found in previous studies, which may be due to their search methods. We believe the accuracy of our search protocol in reproducing internet users' behavior is a significant strength of our study. Reading levels are higher than the current recommendations for health information and may pose barriers to patient accessibility. Overall, online resources may be valuable tools for patients and healthcare providers in the self-management of OA.

Table 1. Program results from the DISCERN, PEMAT, SMOG, and FOG tools

Program	*DISCERN*	*PEMAT*		*SMOG*	*FOG*
		Understandability	*Actionability*		
Arthritis Foundation	4.47	85%	60%	8.6	11.2
WebMD	4.20	85%	60%	8.2	10.7
Cleveland Clinic	4.87	69%	0%	12	16.7
CDC	3.27	77%	60%	9.9	13.4
NHS	4.13	83%	40%	10.3	14.1
Arthritis Society	4.47	94%	80%	9.4	12.4
MayoClinic	4.67	80%	60%	8.9	11.9
WikiHow	4.07	87%	80%	8.8	12
UH Hospitals	3.80	83%	60%	7.9	10.6
ACR	4.20	83%	60%	9.6	12.6
Healthline	4.80	100%	80%	9.2	12.2
NIAMS	3.73	92%	60%	9.1	12.2

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Comparison of Disease Outcome in Psoriatic Arthritis Patients Initiating Early vs Delayed Biologics Treatment: An Analysis From the University of Toronto Psoriatic Arthritis Program Database

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Objectives: Early consultation is associated with better outcome. We aimed to determine whether the short-term response to biologics in biologic-naïve psoriatic arthritis (PsA) is better in patients initiating biologic treatment early in the disease course.

Methods: PsA patients started on biologic therapy from the year 2000 to 2018 at the University of Toronto Psoriatic Arthritis Program were enrolled for analysis. Eligible patients were designated as being in an early treatment (ET) group, defined as starting biologics within 2 years of PsA diagnosis, or delayed treatment (DT) group otherwise. The primary outcome was a 50% reduction in the Disease Activity Index for Psoriatic Arthritis (DAPSA) score at 6-months. Mann-Whitney U-test and χ^2 were used to compare continuous and categorical baseline demographic and disease characteristics, respectively. Logistic regression was used to examine the association between early treatment and DAPSA response at 6-months, adjusted for potential confounders (age at start of treatment, sex, and baseline psoriasis areas severity index (PASI) score).

Results: Of the 252 included patients, 77 patients were in the ET group and 175 patients in the DT group. The mean (SD) age of ET group was 41.4 (13.3) years vs 48.3 (12.6) years for DT group ($P < 0.01$). Significant difference was observed in the mean (SD) time from diagnosis to start of first biologic between two groups (ET: 0.90 (0.62) years, DT: 5.81 (3.61) years; $P < 0.01$). While there was no statistically significant difference in the type of biologics that was prescribed, etanercept was the most frequently prescribed drug in both groups. Higher baseline disease activity was observed among ET group with statistically higher mean swollen joint count ($P = 0.034$), tender joint count ($P = 0.037$), DAPSA score ($P = 0.023$) and NSAID use ($P = 0.017$). Early treatment group also demonstrated higher Health Assessment Questionnaire (HAQ) score ($P < 0.01$), but lower Short Form-Physical Component Score (SF-PCS; $P < 0.01$) compared to the delayed treatment group. There were no statistically significant differences in sex, ethnicity, baseline CRP, ESR, DMARD use, nail lesions, enthesitis, dactylitis, sacroiliitis, joint damage, PASI score and physician global assessment score. Logistic regression modeling demonstrated that early treatment was not associated with DAPSA response at 6-month (OR 0.85, 0.30-2.29, $P = 0.75$), after adjusting for age at start of treatment, sex, and baseline PASI score.

Conclusion: We demonstrate that there is no difference in short-term disease outcome between PsA patients started on early vs delayed biologic treatment. Further analysis evaluating the difference in long-term outcome will be useful.

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A Comparison of PsA and RA Patient Profiles Requiring Advanced Therapies: PsA Patients Access to the Advanced Therapies Earlier Than RA

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Objectives: International guidelines recommend switching to advanced therapy (AT) in patients with Rheumatoid Arthritis (RA) and Psoriatic Arthritis (PsA), when csDMARD therapies fail. There are several factors playing a role in that decision-making, including patients' comorbidities and choices as well as the availability of the treatments. Here we present the results of a comparison of PsA and RA patient profiles requiring advanced therapies, from our pilot biologics clinic. Better patient outcomes in one disease may help us to recognize what can be improved in the other.

	RA (N:22) n(%)	PSA (N:10) n(%)	p
Demographics			
Sex: Female	16 (72,7%)	7 (70%)	1,00[a]
Age; *Mean±SD*	58,3±16,1	50,5±13,6	0,193[b]
Smoking (ever)	14 (63,6%)	6 (60%)	1,00[a]
Alcohol	11 (50%)	2 (20%)	0,141[a]
Physical exercise	15 (68,2%)	6 (60%)	0,703[a]
Disease Features			
RF positive	12 (57,1%)	2 (20%)	0,068[a]
anti-CCP positive	10 (50%)	1 (11,1%)	0,096[a]
CRP positive	8 (38,1%)	4 (40%)	1,00[a]
ESR positive	9 (42,9%)	4 (40%)	1,00[a]
Disease duration (years)	14,5 (20,8)	1,0 (15,0)	**0,047[c]**
Erosive disease	13 (59,1%)	-	-
Deformities	9 (40,9%)	-	-
Extraarticular disease	8 (36,4%)	-	-
Disease pattern-Symmetric polyarthritis	-	10 (100%)	-
Disease pattern-Axial disease	-	4 (40%)	-
Nail Psoriasis (ever)	-	7 (70%)	
Enthesitis (ever)	-	3 (30%)	-
Dactylitis (ever)	-	7 (70%)	-
Duration skin psoriasis	-	25,5 (28)	
Comorbidities			
Heart disease	4 (18,2%)	1(10%)	1,00[a]
Stroke	2 (9,1%)	0 (0%)	1,00[a]
Angina	3 (13,6%)	0 (0%)	0,534[a]
Osteoporosis	7 (38,9%)	2 (20%)	0,417[a]
Depression	10 (45,5%)	3 (30%)	0,467[a]
PHQ-9			
Normal	11 (50%)	3 (30%)	
Mild	5 (22,7%)	1(10%)	
Moderate	1 (4,5%)	1(10%)	N/A
Moderately severe	3 (13,6%)	4 (40%)	
Severe	2 (9,1%)	1(10%)	
COVID-19 infection history	10 (45,5%)	3 (30%)	0,467[a]
Urate	295 (88)	319 (105)	0,799[c]
Framingham CVD risk score	7,5 (10,75)	1,4 (17,6)	0,595[c]
Medications associated with comorbidities			
Anti-platelet	4 (18,2%)	1(10%)	1,00[a]
Anti-coagulant	2 (9,1%)	0 (0%)	1,00[a]
ACE-i/ARB	9 (40,9%)	4 (40%)	1,00[a]
Statin	9 (40,9%)	3 (30%)	0,703[a]
Vitamin-D	20 (90,9%)	5 (50%)	**0,019[a]**
Calcium	12 (54,5%)	3 (30%)	0,265[a]
Previous therapies			
csDMARD current	16 (72,7%)	6 (60,0%)	0,683[a]
Previous number of csDMARDs	3 (2)	2 (2)	**0,039[c]**
Previous number of advanced therapies	0,5 (2,0)	0 (2)	0,764[c]
Time to first biologics initiation from diagnosis	7 (10)	0.5 (4.6)	0.006[c]
Disease activity/clinical			
Morning stiffness	14 (70%)	10 (100%)	0,074[c]
Duration of morning stiffness (hours)	0,75 (1,0)	2,5 (5,5)	**<0,001[c]**
Swollen joint count (66)	7,5 (7,0)	8,5 (7,0)	0.269[c]
Tender joint count (68)	8,0 (22,0)	21,5 (24,0)	0.047[c]
Patient VAS	5,0 (4,0)	6,5 (2,0)	0,119[c]
Physician VAS	5,0 (3,0)	7,0 (2,0)	**0,031[c]**
HAQ	1,00 (1,31)	1,62 (1,09)	**0,047[c]**
CDAI	19,5 (19,0)	-	-
DAS28ESR	4,43 (1,76)	-	-
DAS28CRP	3,90 (1,66)	-	-
BASDAI	-	7,0 (3,9)	-
SPARCC enthesitis score	-	4,0 (4,5)	-
BSA	-	1 (15)	
Dactylitis (current)	-	2 (20%)	-
Number of active nail psoriasis	-	0 (1)	
Enthesis total score	-	10,0 (27,0)	-
Enthesis Doppler Score	-	0 (3,0)	-
Enthesis B-mode score	-	10,0 (26,0)	-
Doppler positive in at least one enthesis region	-	4 (40%)	-
Disease activity/ultrasound			
Ultrasound: GLOESS score	34,0 (28,0)	23,0 (19,0)	0,100[c]
Ultrasound: Doppler score	8,0 (18,0)	4,0 (5,0)	0,129[c]

RF: Rheumatoid factor, Anti-CCP: cyclic citrullinated peptide, CRP: C-reactive protein, ESR: Erythrocyte Sedimentation rate, CVD: Cardiovascular Disease, csDMARD: conventional syntactic Disease Modified anti-rheumatism Drug, VAS: visual analogue scale, HAQ: Health Activity Questionnaire, CDAI: Clinical disease activity index, DAS: Disease activity score, GLOESS: Global synovitis score

[a]: Fisher exact test [b]: Independent samples t test [c]: Mann Whitney U Test

*All numeric variables given as median (Inter quartile range).

Methods: Biologics clinic is a new initiative at the Ottawa Hospital aiming to improve the long-term outcomes of patients with inflammatory arthritis. Patients who are about to start or switch to another AT are evaluated at the biologics clinic. Extensive data regarding disease history, medication exposure and disease activity measures are collected in a standard fashion; the comorbidity burden is documented and managed. A protocoled ultrasound is conducted at baseline and three-month intervals, until reaching remission. The data presented here represent a pilot exploratory comparative analysis.

Results: PsA (n = 10) and RA (n = 22) patients had similar demographic features, including sex and age (Table). The majority of the comorbidities were similar in both groups, although PsA patients had more frequent liver disease numerically and less alcohol use. PsA patients had more tender joints, although the US scores of RA patients were higher. Disease duration at the first biologic therapy was significantly less in PsA (0.5 (4.6) years) compared to RA (7 (10), $P = 0.006$) and PsA patients were less treated with csDMARD therapies.

Conclusion: According to our preliminary data, PsA patients access to AT earlier than the RA patients. This may be due to the heterogeneity of PsA, such as manifestations other than the joint inflammation (such as enthesitis and axial disease) determining treatment decisions. PsA patients also had more frequent liver disease, which also prevented initiation of csDMARD therapies and led to expediated initiation of the AT- as early as at diagnosis. Whether earlier access leads to better patient outcomes in PsA compared to RA, will be investigated with long-term follow up. PsA patients having more tender joints despite less severe US scores is possibly due to the proximity of the enthesis to the joints and difficulties to differentiate entheseal pain from joint involvement by the physical exam. The use of US may improve the assessment of the domains in PsA leading to choosing the right treatments.

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An Audit of Patient Satisfaction During the First Six Months of The Ottawa Hospital's Rheumatology Biologics Clinic: A Quality Assessment Initiative

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Objectives: Individuals with inflammatory arthritis (IA) such as Rheumatoid Arthritis (RA), Psoriatic Arthritis (PsA), and Axial Spondyloarthritis (AxSpA) have an elevated risk of cardiovascular disease, infections, malignancy, and osteoporosis. In February 2022, we initiated the biologics clinic in our hospital's division for patients starting biologic disease-modifying antirheumatic drugs (bDMARDs) or targeted synthetic DMARDs. We collected extensive data on comorbidity, disease-/medication- history, disease activity measures, and musculoskeletal ultrasound (MSUS) images of joints, entheses, and tendons. We also educated patients on biologic safety and ensured their vaccinations and infectious screening are completed. These are repeated at follow-up visits to facilitate treatment decisions and new comorbidities are investigated. With this audit, we aim to qualitatively evaluate patients' experiences with the biologics clinic.

Methods: We conducted a telephone-based audit of patients' experience. Our clinical coordinator, AZ, contacted a random sample of 26 biologics clinic patients and conducted a 15-20 minute-long structured, formal interview. Patient responses were anonymously reviewed by our clinical team, followed by thematic analysis to determine categories of patient experiences.

Results: Of the 26 patients, 58% were female, 46% had RA, 27% PsA, 27% AxSpA, and had mean age of 53 ± 15 years. 46% were initiating their first biologic. The mean time from referral to biologic assessment was 10 ± 7 days and average time to start a biologic was variable, 40±40 days. 100% of respondents had a generally positive experience with the clinic. 73% felt that the biologics clinic provided additional value beyond their typical rheumatology appointments. 96% felt that the pre-biologic consultation was a positive experience, however one patient felt that the team did not explain the reason behind the extensive questioning. 92% found the MSUS appointment to be useful; most found it interesting, informative, and validating condition specifics. 54% of patients felt that they learned novel information about their disease/biologic. One patient suggested adapting this clinic model to other settings. Suggested improvements included shortening wait time to our/associated departments and biologic initiation, making our clinic schedule more flexible, and resolving transportation/parking issues.

Conclusion: Feedback regarding the patient-oriented success of the biologics clinic is reassuring. From suggestions, we have expanded our clinic hours to facilitate more timely appointments. We have been providing further reasoning for running this specialized clinic to patients. Our next steps will be to quantify arising comorbidities and measure improved pre-biologic vaccination rates. We will also use the BioSafe questionnaire to quantify the educational success of the clinic regarding safety measures while on bDMARDs.

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Real-World Effectiveness, Safety Profile, and Persistence of Upadacitinib. A Prototype for Collaboration Among Rheumatology Registries in Canada. The RHUMADATA-OBRI Partnership

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Objectives: Health Canada approved Upadacitinib (UPA) in January 2020 to treat moderate-to-severe rheumatoid arthritis (RA). It was launched just before the COVID-19 pandemic, making its early monitoring challenging. Virtual visits resulted in a shortage of rheumatologist-reported measures and clinical and safety outcomes. We first outline the steps to establish a collaboration between RHUMADATA and the Ontario Biologics Research Initiative (OBRI) required to monitor early UPA use. Next, we describe the

Table 1. Characteristics of selected patients

	Advanced treatment		
	TNFi	UPA	ALL
N	142	118	260
Female	109/142 (76.8%)	103/118 (87.3%)	212/260 (81.5%)
Age @ treatment initiation (TI), years, mean (standard deviation (sd))	61.3 (12.9)	60.9 (10.2)	61.1 (11.8)
Current smoker	13/125 (10.4%)	7/98 (7.1%)	20/223 (9.0%)
Disease duration @ TI, years, mean (sd)	14.4 (11.0)	13.1 (9.8)	13.8 (10.5)
Rheumatoid factor (RF) positive	94/133 (70.7%)	65/113 (57.5%)	159/246 (64.6%)
Anti-citrullinated protein/peptide antibody (ACPA) positive	67/103 (65.0%)	59/93 (63.4%)	126/196 (64.3%)
Days on AT (stop-start), mean (sd)	392.1 (249.6)	510.1 (201.7)	445.7 (236.1)
Reason for TNFi or UPA cessation			
AT ongoing	136 (95.8%)	116 (98.3%)	252 (96.9%)
Primary failure	1 (0.7%)	1 (0.8%)	2 (0.8%)
Adverse events	1 (0.7%)	0 (0.0%)	1 (0.4%)
Physician decision	1 (0.7%)	0 (0.0%)	1 (0.4%)
Other	3 (2.1%)	1 (0.8%)	24(1.6%)
Previous csDMARDs	129/142 (90.8%)	84/118 (71.2%)	213/260 (81.9%)
Previous advanced treatment (AT)	96/142 (67.6%)	68/118 (57.6%)	164/260 (63.1%)
Concomitant use of MTX	83/142 (58.5%)	48/118 (40.7%)	131/260 (50.4%)
Erythrocyte sedimentation rate (ESR) @ TI (mm/hr)			
N	79	73	152
mean (sd)	21.3 (18.1)	23.9 (24.0)	22.5 (21.1)
ESR @ follow-up (FU) (mm/hr)			
N	39	36	75
mean (sd)	19.6 (17.5)	18.8 (18.0)	19.2 (17.6)
C-reactive protein (CRP) @ TI (mg/L)			
N	96	97	193
mean (sd)	8.6 (13.3)	8.9 (16.4)	8.8 (14.9)
CRP @ FU (mg/L)			
N	44	49	93
mean (sd)	9.3 (15.1)	3.4 (4.4)	6.2 (11.2)
Health assessment questionnaire disability index (HAQ-DI) @ TI			
N	100	86	186
mean (sd)	1.0 (0.7)	1.3 (0.7)	1.2 (0.7)
HAQ-DI @ FU			
N	42	37	79
mean (sd)	1.0 (0.8)	1.0 (0.7)	1.0 (0.7)
Clinical disease activity index (CDAI) @ TI			
mean (sd)	16.2 (13.6)	23.7 (13.2)	20.1 (13.8)
CDAI-remission @ TI	11/65 (16.9%)	0/69 (0.0%)	11/134 (8.2%)
CDAI-low DA @ TI	25/65 (38.5%)	10/69 (14.5%)	35/134 (26.1%)
CDAI @ FU			
mean (sd)	14.2 (12.6)	17.0 (14.3)	15.7 (13.5)
CDAI-remission @ FU	4/26 (15.4%)	3/29 (10.3%)	7/55 (12.7%)
CDAI-low DA @ FU	11/26 (42.3%)	10/29 (34.5%)	21/55 (38.2%)

characteristics and treatment retention of RA patients treated with a TNF inhibitor (TNFi) or UPA during COVID-19.

Methods: (1) Collaboration: We reviewed past collaborations and written communications (emails, phone calls, virtual meetings) between OBRI and RHUMADATA to describe the steps leading to abstract submission. (2) Treatments: Study participants were adults when diagnosed. Participants provided informed consent (IC) and were enrolled in RHUMADATA or OBRI. Data sharing was consented to by all patients. Retention curves for UPA and TNFi were analyzed but not compared.

Results: (1) Collaboration: -A research question emerged from the lack of data reported for UPA. -We identified the study population to determine feasibility. -Comparison of data collection methods. -Uniform definitions of data variables and discrepancy-handling solutions. -Data collection time window and sample size were established. -Data sharing was not included in the original OBRI IC. As a result, OBRI patients were asked to re-consent. -Formal protocol jointly developed. -Data-sharing agreement and a contract were drafted and submitted to the UHN for review and approval of ethics (REB). -Data was pooled securely. -The registry's baseline characteristics were analyzed, and discrepancies addressed. -Analysis. -Abstract. (2) Treatments: This analysis included 260 patients (118 UPA and 142 TNFi), with average age of 61.1 (11.8), 81.5% female and 9.0% smokers. Disease duration was 13.8 (10.5) years at treatment initiation, and 64.6% and 64.3% were RF and ACPA positive. Retention was high as 96.9% of patients remained on their medications at EOS. HAQ-DI and CDAI scores are shown in Table 1.

Conclusion: (1) Collaboration: RA registries collect standard variables but pooling them requires many steps. The harmonization process must be clearly described to evaluate the analysis's quality. (2) Treatments: TNFi and UPA patients had similar treatment retention. In addition, few patients discontinued treatment over a mean (SD) follow-up of 445.7 (236.1) days. In the future, larger sample sizes will allow us to address our objectives better and account for the impact of non-randomized treatment assignments in observational studies.

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Analysis of the RHUMADATA™ Clinical Database and Registry Using a Data Science Approach

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Objectives: For this study, we used RHUMADATA patient records that allowed geolocation. The impact of socio-economic and geographical factors on treatment success is studied with data science models. Data science combines domain expertise with computer capability, math, and statistics skills to deliver meaningful insights. Data science uses algorithms to construct regression and classification models.

Methods: We developed a model to predict initial treatment success using RHUMADATA data. By proxy, weight and postal codes reflect socio-economic and regional factors. We constructed six models, one unaffected by treatment, while the others depend on initial treatment (ETANERCEPT, ADALIMUMAB, INFLIXIMAB, GOLIMUMAB, and ABATACEPT). By comparing results, we can determine which processing sequence performs best. This model uses a penalized logistic approach (in which minor relevant predictors are discounted by a penalty). The models were trained and adjusted to find the best fit. Random forest models were then built. To evaluate and compare them, ROC curves were used. This study used variables with fewer than fifty percent of values missing. These included sociodemographic factors, concurrent use of csDMARDs and other drugs, comorbidities, laboratory tests, patient-reported outcomes (PROs), joint counts, and rheumatologist global assessments. In addition, we built six smaller datasets, one for each model. Twenty-five percent of each dataset will be used for testing and seventy-five percent for training. Validation will be performed on twenty percent of the training set.

Table 1: area under the curve (AUC) for the treatments' specific models

	ETANERCEPT	ADALIMUMAB	INFLIXIMAB	GOLIMUMAB	ABATACEPT
AUC	0.575	0.637	0.385	0.542	0.402

Results: The model presented is independent of the therapy administered to the patient and uses data from 1269 advanced treatment episodes. We ran penalized logistic regression and random forest models. For that dataset, the random forest model is uniformly better across event probability thresholds. Training and tuning produced a model, with an area under the curve (AUC) of 0.655 and validation produced an AUC of 0.679. In that model, socio-economic and geographical features play a substantial role. We also ran our models on the different treatments to find factors that would predict the success of therapy. The results are presented in Table 1.

Conclusion: We obtain promising results, allowing us to understand better which variables are essential to the success of treatment. The socio-economic and geographic features play an influential role as they can help design better public health policies.

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Practice Gaps and Educational Needs of Canadian Rheumatologists Treating RA Patients With Treat-to-Target Approach: Evidence From a Canadian Survey

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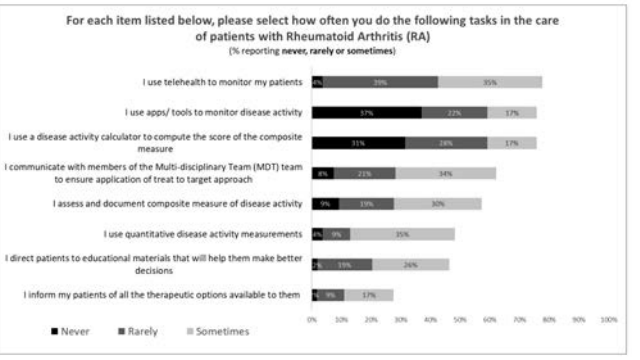
Objectives: To assess current knowledge, skills and practice behaviors of Canadian rheumatologists as it relates to the treat-to-target (T2T) approach management of rheumatoid arthritis (RA) patients and identify perceived barriers to real-world implementation of T2T in Canadian practice.

Methods: A 10 minutes non-remunerated quantitative survey was deployed to rheumatologists in 35 countries. Data presented here was collected in Canada between June 6 to July 31, 2022. Eligibility criteria included: active practice in rheumatology for ≥ 2 years and having ≥ 10 unique RA patients/year. The survey included frequency questions asked on a 5-point rating scale (never/rarely/sometimes/often/always). Barriers were assessed on a 4-point scale (not at all a barrier/minor/moderate/serious barrier). Knowledge, skill, and confidence questions were asked on a 5-point scale and recoded as dichotomous variables for analysis: sub-optimal (no; basic; intermediate knowledge/skill; slightly/somewhat confident), and optimal (advanced or expert knowledge/skill; confident/very confident).

Results: Among surveyed Canadian rheumatologists (n = 54) 52% had practiced rheumatology for over 21 years, 15% between 11-21 years, and

Figure 1: Least performed care tasks by rheumatologists in Canada (n= 54)



34% between 2-10 years. Over three-quarters (78%) reported applying T2T approach consistently or frequently. Despite awareness of T2T principles, participants reported sub-optimal knowledge of standardized methods to assess patients' health literacy levels (65%), how to explain T2T approach to patients (41%), and patient-reported outcomes (PROs) to assess disease activity (35%). Sub-optimal skills were reported in determining health literacy of patients (50%), using PROs to assess disease activity (33%), and adapting T2T principles to clinical context when treating patients with RA (26%). Survey participants reported never or rarely using apps or tools to monitor disease activity (59%), using a disease activity calculator (59%) or using telehealth to monitor patients (43%; Figure 1). The factors most frequently reported to be barriers to the measurement of disease activity included: medical records not adapted to document measures (19%); patient not adhering to treatment (18%); and differences in assessments reported by patients and composite measures (16%). Surveyed rheumatologists reported never using treatment considerations checklists (42%); self-reflection questionnaires (39%); and shared decision-making tools (31%) in their practice with RA patients. Common reasons for not using tools included tools not being available or lacking awareness of their existence or tools being time-consuming.

Conclusion: Results from this survey sheds light on potential practice gaps and educational needs of Canadian rheumatologists. These insights can inform the development of educational programs and interventions to support a better implementation of T2T to improve care delivered to patients with RA in Canada.

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Use of Internet-Based COVID-19 Information Among a Rheumatology Interested Population

Steven Katz (University of Alberta, Edmonton); Jill Hall (University of Alberta, Edmonton)

Objectives: Throughout the COVID-19 pandemic, different rheumatology organizations have provided web-based information to patients and the public on COVID-19 which may be unique to those with rheumatic disease. The uptake of this information has not been widely reported. This study reviews user interaction with the COVID-19 resources available on the AlbertaRheumatology.com website and how that compares to overall website interaction.

Methods: The AlbertaRheumatology.com website was originally established in 2010 with an intended varied audience of those interested in rheumatic disease in the province of Alberta. In March 2020, information on COVID-19 was first posted with regular ongoing updates, with a second page focused on COVID-19 vaccines posted December 2020. Data analytic software is embedded in these resources, which allows the administrator to determine the number of webpage views, visit length, and geographical location. This data was collected and compared to non-COVID resources available through the website.

Results: Between January 2020 and August 31, 2022, COVID-19 resources on the AlbertaRheumatology website had 16,360 webpage visits, representing 3.34% of website page views during the time. Peak visits occurred in March 2020, January to March 2021, and September 2021. Just over half (55%) of the visits were to the COVID-19 vaccine page, 40% to the COVID-19 overview page, with the remainder visiting the "Ask the Rheumatologist" area. Visit length averaged 4:12 minutes for COVID-19 vaccines and 2:12 minutes for the COVID-19 overview, compared to an average of 2:05 minutes for other areas of the website. 71% of visitors were from the province of Alberta, 17% from other regions of Canada, and the remainder international, compared to the overall website where only one-third of users are from Alberta and 50% from Canada.

Conclusion: The COVID-19 resources developed for the Alberta Rheumatology website appear to have had good user engagement. Users spent more time visiting the web-based resources compared to other areas of the website, with better engagement in the geographic target audience of Alberta.

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Patient and Rheumatologist Interest in the Development of a New Methotrexate Delivery System

Jill Hall (University of Alberta, Edmonton); Steven Katz (University of Alberta, Edmonton)

Objectives: Methotrexate remains the gold standard medication for rheumatoid arthritis. It is considered first line therapy for most patients and is often used in combination with advanced therapies to support maximum therapeutic benefit. Further, data suggest that subcutaneous methotrexate may be more efficacious than oral methotrexate with similar if not less risk of adverse events. Despite this, it is also known that methotrexate adherence is poor (with many studies suggesting patients are only approximately 50% adherent), which clearly impacts its potential benefit, and thus overall healthcare costs. Medication delivery systems that are more user friendly have demonstrated improved patient adherence. Our objective was to determine rheumatologist and patient acceptance of a theoretical new reusable autoinjector system for methotrexate.

Methods: A survey was distributed to rheumatologists in Edmonton, Alberta as well as throughout Canada. The survey focused on preference for methotrexate formulation and delivery system and willingness to pay. Responses were stratified based on the current methotrexate delivery systems (oral, injectable methotrexate, preloaded methotrexate syringe). A similar survey was shared with consecutive patients at a community-based rheumatology clinic in Edmonton.

Results: Thirty rheumatologists and 102 patients participated in the survey. A majority of rheumatologists indicated they preferred the new delivery device, sharing they would switch 2/3 of patients on traditional injection methotrexate, 56% on oral methotrexate, and 58% on prefilled syringes. Patients also preferred this proposed device. Of those using injectable methotrexate (N = 56), 81% were likely to switch, while of those using oral methotrexate, 42% stated they were likely to switch. Fifteen of twenty-two (69%) patients no longer on methotrexate would prefer this product if they were still on methotrexate. Most respondents felt this new product should be the same price as current offerings, with a strong minority suggesting they would be willing to pay $10-25 more per month if it was available.

Conclusion: There appears to be interest from both rheumatologists and patients in a new methotrexate delivery device that would simplify delivery and reduce environmental impact. Based on similar literature, there is a suggestion this device may also improve medication adherence, which could then also improve patient outcomes. Further exploration of device development should occur.

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Impact of Patient Characteristics, Including Sex, on the Efficacy of Upadacitinib Compared With Adalimumab in Patients With Psoriatic Arthritis

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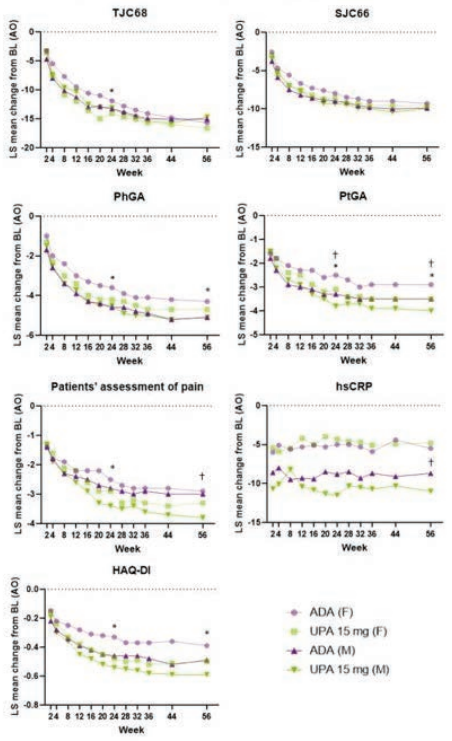
Objectives: This post hoc analysis of the Phase 3 SELECT-PsA 1 trial (NCT03104400) evaluated responses to the Janus kinase inhibitor upadacitinib (UPA) vs the TNF inhibitor adalimumab (ADA) at weeks 24 and 56 in selected patient subgroups.

Methods: Patients in SELECT-PsA 1 were randomized 1:1:1:1 to UPA 15/30 mg once daily, ADA 40 mg every other wk, or placebo (PBO)

Figure. Improvement in key signs and symptoms of PsA from BL to Week 56 in M and F



Mixed model for repeated measures using AO data.
Comparisons unadjusted for multiplicity: *Nominal p≤0.05 for UPA vs ADA in F; †Nominal p≤0.05 for UPA vs ADA in M. p-values are shown only for Weeks 24 and 56.
AO, as observed; LS, least squares.

followed by UPA 15/30 mg starting at Week 24; treatment was double blinded until Week 56. This subgroup analysis evaluated the efficacy of UPA 15 mg vs ADA based on patients' ages (< 65 vs ≥ 65 years), sex (male [M] vs female [F]), BMI (< 30 vs ≥ 30 kg/m^2), time since diagnosis (< 2 vs ≥ 2 years), and symptom duration (< 9 vs ≥ 9 years) at baseline (BL). Outcomes assessed included ACR20/50/70, PASI75/90, and resolution of enthesitis, all at Weeks 24 and 56; and change from BL in tender/swollen joint count in 68/66 joints (TJC68/SJC66), Physicians' and Patients' Global Assessment of disease activity (PhGA and PtGA), patients' assessment of pain, high-sensitivity CRP (hsCRP), and Health Assessment Questionnaire-Disability Index (HAQ-DI) through Week 56.

Results: ACR20/50/70 response rates at Week 24 were significantly greater with UPA vs PBO across all subgroups evaluated, but not across all subgroups with ADA vs PBO. For ACR20/50, treatment effect sizes differed by sex and BMI, with greater differences seen in M vs F and in patients with lower (< 30 kg/m^2) vs higher BMI. ACR20/50/70 response rates at Week 56 were either comparable or higher with UPA vs ADA in both sexes. Changes from baseline in TJC68/SJC66 were generally comparable between sexes in both treatment groups (Figure). Generally greater mean changes were also observed in HAQ-DI from BL to Week 56 for M vs F within treatment groups. The same was true of PhGA and PtGA, albeit to a lesser extent. Patients' assessment of pain at BL was lower for M (UPA, 5.8; ADA, 5.4) vs F (UPA, 6.5; ADA, 6.5). Significantly greater improvements from BL were seen at Week 56 with UPA vs ADA in PhGA, PtGA, and HAQ-DI in F, and in PtGA, patients' assessment of pain, and hsCRP in M.

Conclusion: We observed sex-based differences in response to UPA vs ADA in patients with PsA. Significantly greater improvements in ACR70, PtGA, patients' assessment of pain, and hsCRP in M, and in ACR50/70, PASI75, PhGA, PtGA, and HAQ-DI in F, were seen with UPA vs ADA at Week 56.

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Efficacy of Guselkumab in Three Cohorts of Biologic-Naïve PsA Patients With Axial Involvement Defined Based on Imaging and Machine Learning Criteria: Pooled Analysis of Two Phase 3 Studies

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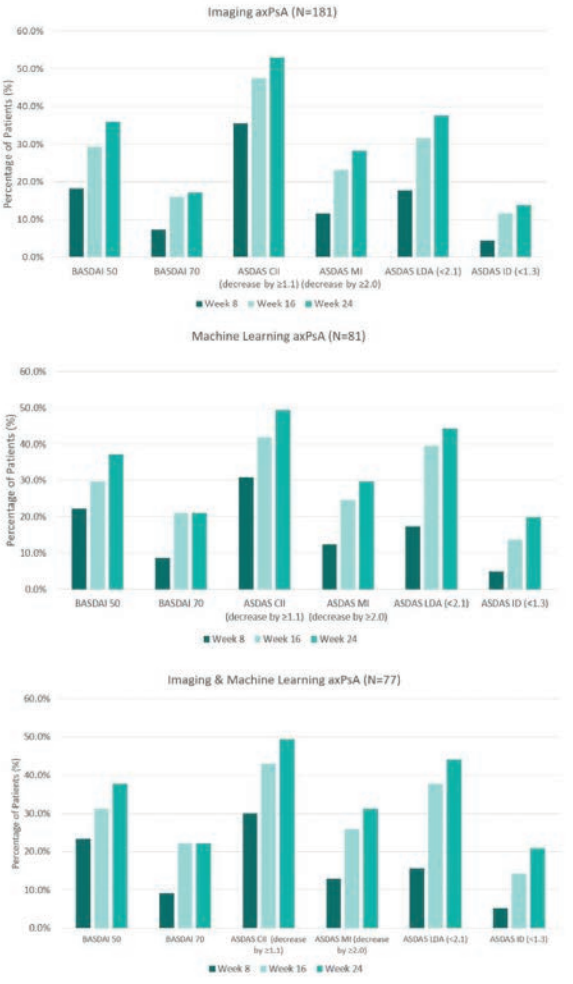
Objectives: Guselkumab (GUS), showed early and sustained improvements in Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Ankylosing Spondylitis Disease Activity Score (ASDAS) among patients (pts) from the DISCOVER-1/2 studies (D1+D2) with imaging-confirmed sacroiliitis consistent with axial involvement. Using unsupervised machine learning (ML), a cluster of D1+D2 pts with axial involvement was identified. We sought to contrast pt profiles across axPsA cohorts defined by imaging and ML criteria and to evaluate the efficacy of GUS in improving disease activity across cohorts.

Figure 1. BASDAI/ASDAS Endpoint Achievement Through W24 Among GUS-Randomized Pts



Methods: Adult pts enrolled in D1+D2 had active PsA despite standard therapies. Pts were randomized 1:1:1 to GUS 100 mg every 4 weeks (Q4W); GUS 100 mg at W0, W4, then Q8W; or placebo. This post hoc analysis included bio-naïve GUS-treated pts (pooled GUS Q4W and Q8W) who met one of the following axPsA definitions: (1) Presence of spondylitis based on imaging confirmation (Imaging axPsA); (2) ML-identified axial cluster2 (ML axPsA); (3) fulfillment of both Imaging & ML axPsA definitions. Efficacy assessments included least squares mean changes in BASDAI, modified BASDAI (mBASDAI; excluding peripheral joint pain), spinal pain (BASDAI Q2), morning stiffness (BASDAI Q5/6) scores and ASDAS, as well as achievement (employing non-responder imputation for missing data) of ≥ 50% (BASDAI50) or ≥ 70% (BASDAI70) improvement in BASDAI, and ASDAS response of low disease activity (LDA; < 2.1), inactive disease (ID; < 1.3), clinically important improvement (CII; change of ≥ 1.1), and major improvement (MI; change of ≥ 2.0).
Results: 185/669 (28%) bio-naïve GUS-treated pts in D1+D2 were included (181 Imaging axPsA, 81 ML axPsA, 77 both definitions). Baseline characteristics were comparable across cohorts. Irrespective of axPsA definition, GUS treatment was associated with significant (nominal $P < 0.001$) improvements in BASDAI, mBASDAI, spinal pain, morning stiffness, and ASDAS at W8 that continued being enhanced through W24. The proportion of pts achieving categorical BASDAI & ASDAS endpoints also increased through W24, with W24 response rates of 36-38% for BASDAI50, 17-22% for BASDAI70, 49-53% for ASDAS CII, 28-31% for ASDAS MI, 38-44% for ASDAS LDA, and 14-22% for ASDAS ID across the 3 cohorts (Figure 1).
Conclusion: Irrespective of different definitions, pts with active axPsA treated with GUS had significant and clinically meaningful improvements in BASDAI score, mBASDAI score, and ASDAS as early as W8, including in axial-specific domain of spinal pain, that continued to improve through W24. These results further support the efficacy of GUS in treating PsA pts with axial involvement.

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Long-term Efficacy of Guselkumab in Fatigue and Identification of Early Treatment Targets: Post Hoc Analysis Through 2 Years of a Phase 3, Randomized, Double-Blind, Placebo-Controlled Study Conducted in Biologic-Naïve Patients With Active Psoriatic Arthritis

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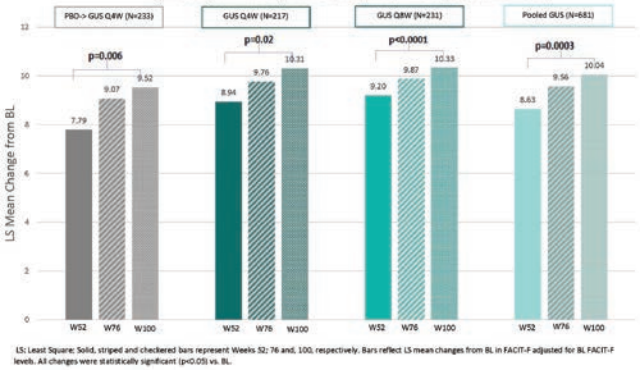
Objectives: Guselkumab (GUS) demonstrated clinically meaningful improvements in fatigue through one year.[1] In this post hoc analysis, the Functional Assessment of Chronic Illness Therapy - Fatigue (FACIT-F) scale was used to: evaluate the long-term effect of GUS in maintaining improvements or improving fatigue between week (W) 52 and W100, and to identify early (W8) predictors for improved long-term fatigue outcomes.
Methods: DISCOVER-2 enrolled active PsA adult patients (pts) naïve to biologics/JAK inhibitors.[2] Pts were randomized (1:1:1) to GUS 100 mg every 4W (Q4W); GUS 100mg at W0, W4, then Q8W; or placebo (PBO→GUS Q4W; crossing over to GUS Q4W at W24). Pts with baseline (BL) fatigue lower than a normative FACIT-F score ≤ 433 were included (N = 681). The proportions of pts with clinically meaningful improvement (≥ 4 points) from BL in FACIT-F and with normative FACIT-F levels between W52 and W100 were calculated using non-responder imputation and compared over time within each treatment group. Changes in FACIT-F over time were assessed with mixed models adjusting for time, treatment group, their interaction, and BL FACIT-F score. Receiver operating characteristics (ROC) analyses used Youden's index to determine optimal cutoffs at W8 for predicting achievement of normative scores and clinically meaningful FACIT-F responses at W100.
Results: The BL mean (SD) FACIT-F score [28.3 (8.7)] was similar across treatment groups. At W52, 66.1%, 69.6%, 68.0%, and 67.8% of pts in the PBO→GUS Q4W, GUS Q4W, GUS Q8W, and pooled GUS groups, respectively, achieved clinically meaningful improvements from BL in FACIT-F score; response rates were maintained through W100. Normative FACIT-F levels were achieved by 24.9%, 28.1% 29.4% and 27.5% of pts in each treatment group, respectively, at W52, and by increasingly greater proportions of pts through W100. Significant improvements from BL in FACIT-F scores were observed at W52, with further improvements seen from W52 to W100 across all GUS groups (Figure 1). ROC optimal cutoff in FACIT-F improvement from BL to W8 associated with a clinically meaningful improvement in FACIT-F at W100 was ≥ 2.0; while for achieving normative FACIT-F levels at W100, the optimal cutoff in actual FACIT-F score at W8 was ≥ 39.5.
Conclusion: Clinically meaningful improvements in fatigue seen after 1 year of GUS treatment were further enhanced through 2 years, at which time nearly a third of GUS-treated pts reported normative FACIT-F levels. Early targets in FACIT-F levels achieved with GUS were identified to aid in guiding treatment decisions in routine clinical practice. References: [1.] Rahman P. Arthritis Res Ther 2021;23:190. [2.] Mease PJ. Lancet 2020;395:1126–36.

Figure 1. Change in FACIT-Fatigue from BL at W52, W76, and W100 by GUS Treatment Group



LS: Least Square; Solid, striped and checkered bars represent Weeks 52; 76 and, 100, respectively. Bars reflect LS mean changes from BL in FACIT-F adjusted for BL FACIT-F levels. All changes were statistically significant (p<0.05) vs. BL.

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Residual Burden and Disease Activity of Canadian PsA Patients Treated With Advanced Therapies: Preliminary Results From a Multi-Registry Analysis (UNISON-PsA)

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Table. Patient demographic, baseline characteristics and response to treatment

	Atlantic (N=83)	Quebec (N=687)	Ontario (N=966)	West (N=130)
Age (years, mean [SD])	50.3 (11.1)	50.7 (12.1)	49.1 (12.9)	46.7 (12.1)
Female (n [%])	44/83 (53.0)	346/687 (50.4)	427/966 (44.2)	81/128 (62.3)
BMI (kg/m^2, N, mean [SD])	15, 30.8 (3.6)	553, 29.6 (6.6)	579, 30.6 (6.9)	45, 32.8 (10.6)
Time since diagnosis (years, N, mean [SD])	83, 8.7 (8.7)	687, 7.1 (7.9)	895, 11.7 (11.1)	74, 11.7 (8.9)
HLA-B27 positive (n/N [%])	N/A	58/335 (17.3)	86/648 (13.3)	N/A
Presence of EAMs (n/N [%])	4/44 (9.1)	27/687 (3.9)	65/693 (9.4)	2/33 (6.1%)
Fulfillment of Classification Criteria for Psoriatic Arthritis (CASPAR) (n/N [%])	N/A	391/687 (56.9)	100/100 (100)	N/A
Therapy class (n [%]):*				
TNFi	66 (79.5)	478 (69.6)	651 (67.3)	104 (80.0)
IL-17i	11 (13.3)	106 (15.4)	191 (19.9)	21 (16.2)
IL-12/23i	6 (7.2)	33 (4.8)	124 (12.9)	5 (3.9)
PDE4i		48 (7.0)		
Other		22 (3.2)		
Failure to achieve MDA within 6 months of starting therapy (n/N [%])**	18/21 (87.5)	184/246 (74.8)	391/571 (68.1)	30/43 (69.8)
Failure to achieve DAPSA ≤14 within 6 months of starting therapy (n/N [%])**	N/A	74/110 (67.3)	201/365 (55.1)	3/3 (100.0)

*Patients may be taking >1 advanced therapy, **Not all patients had assessments of disease activity.

Objectives: To describe residual disease activity in Canadians with PsA treated with advanced therapies.

Methods: Multi-region, observational, retrospective analysis of data from Rhumadata (Quebec) and International Psoriasis and Arthritis Research Team (IPART) Canadian registries was performed separately. Patients included in the registries were eligible if they were adults at the time of PsA diagnosis and were treated with an advanced therapy for ≥ 6 months initiated between January 2010 and December 2019. Residual disease activity was defined as failing to achieve Minimal Disease Activity (MDA, defined as achieving ≥ 5 of: TJC ≤ 1; SJC ≤ 1; PASI ≤1 or BSA ≤ 3%; patient pain VAS score of ≤ 15 mm; patient global disease activity VAS score of ≤ 20 mm; HAQ score ≤ 0.5; and tender entheseal points ≤ 1) (primary endpoint), or Disease Activity in Psoriatic Arthritis (DAPSA) score ≥ 14 (secondary endpoint) within 6 months of initiation of an advanced therapy (TNFi, IL-12/23i, IL-17i, PDE4i, CTLA4i or JAKi).

Results: A total of 1866 subjects (Atlantic [IPART; Newfoundland]: N = 83; Quebec [Rhumadata]: N = 687; Ontario [IPART]: N = 966; West [IPART; British Columbia, Manitoba]: N = 130) were included in this preliminary analysis. Baseline characteristics are presented in the Table. Overall, 899 were receiving their 1st advanced therapy, 464 were receiving their 2nd, and 264 had received ≥ 3. The most common therapy class was TNFi, followed by IL-17i. Eighteen of 21 (85.7%) subjects in the Atlantic region with an assessment, 184/246 (74.8%) in Quebec, 391/571 (68.1%) in Ontario, and 30/43 (69.8%) in Western Canada failed to achieve MDA within 6 months following advanced therapy initiation (Table). Failure to achieve MDA within the allotted period was higher among patients receiving an IL-17i compared with a TNFi. There was no appreciable effect of lines of therapy. Also, 74 of 110 (67.3%) Quebec patients with an assessment, 201/365 (55.1%) in Ontario and 3/3 (100%) in the West failed to achieve at least low disease activity (LDA; DAPSA ≤ 14) within 6 months following initiation of an advanced therapy. Data were not available for the Atlantic region. The proportion of patients not achieving LDA by advanced therapy was similar for those receiving a TNFi and IL-17i but increased with line of therapy.

Conclusion: Preliminary data show that approximately three-quarters of Canadians with PsA failed to achieve MDA or LDA within 6 months of initiating an advanced therapy. Disease duration is a possible explanation for not achieving MDA or LDA; better therapeutic approaches are needed to achieve these outcomes in patients with PsA.

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Sustained Response to Guselkumab Regardless of Baseline Demographic, Disease, and Medication Characteristics in Patients With Active Psoriatic Arthritis and an Inadequate Response to TNF Inhibitors: Results From a Phase 3B Trial

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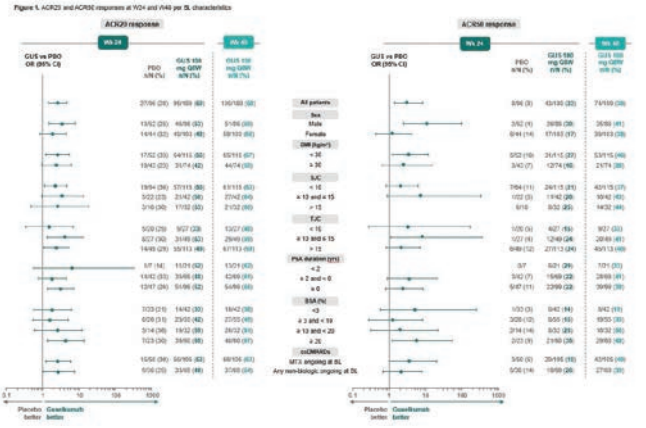
Objectives: In the COSMOS trial, guselkumab (GUS) significantly improved signs/symptoms of psoriatic arthritis (PsA) vs placebo (PBO) in patients (pts) with an inadequate response (IR) to TNF inhibitor (TNFi) therapy. The primary endpoint ACR20 response at Week (W)24 was achieved, with the benefit of GUS vs PBO. This post hoc analysis evaluated if response to GUS across disease domains was maintained through 1 year across various subgroups.

Methods: Adults with active PsA who are inadequate responders to 1-2



TNFi therapies were randomized (2:1) to GUS 100 mg or PBO. GUS group were treated at W0, W4, then every 8 weeks (Q8W) to W44; PBO group were treated at W0, W4, then Q8W with crossover to GUS at W24 followed by GUS Q8W at W28 to W44. Pts with < 5% improvement from baseline (BL) in SJC and TJC qualified for W16 early escape (EE); EE pts receiving GUS continued treatment, while pts receiving PBO crossed over to GUS. Efficacy of GUS in subgroups was evaluated at W24 and W48 via joints (ACR20/50), skin (Psoriasis Area and Severity Index [PASI]100), and multi-domain (minimal disease activity [MDA]). Subgroups were defined by sex, body mass index (BMI), SJC, TJC, PsA duration, % psoriatic body surface area (BSA), and conventional synthetic DMARD use. Odd ratios (ORs) and 95% confidence intervals (CIs) for GUS vs PBO are shown for each subgroup at W24. No treatment comparison was performed after W24. Pts who discontinued and/or met EE criteria were imputed as non-responders. Missing data were also imputed with no response through W48.

Results: 285 pts were randomized to GUS (n = 189) or PBO (n = 96). BL characteristics were generally similar between treatment groups. At W16, 39 (21%) pts in the GUS group and 45 (47%) pts in the PBO group were assigned to EE. Joints, skin, and multi-domain response rates at W24 were numerically greater in GUS vs PBO pts, with the benefit of GUS consistent across all subgroups of adequate sample size (Figure 1 [ACR20/ACR50]). Response rates with GUS were maintained, or numerically increased, from W24 to W48, regardless of BL subgroup.

Conclusion: GUS 100 mg Q8W led to improvements vs PBO in joints, skin, and multi-domain outcomes at W24 across subgroups of TNFiIR PsA pts defined by selected demographics, disease characteristics, and ongoing medications at BL. Response to GUS was maintained or further improved through 1 year regardless of BL subgroup.

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Clinical Outcomes and Physician-Patient Alignment in Patients With Psoriatic Arthritis Receiving Ixekizumab

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Objectives: Study objectives were to assess the clinical status of patients with psoriatic arthritis (PsA) at the point of initiating ixekizumab treatment and at data collection; as well as evaluate the alignment between patients and their physicians regarding their clinical status at these timepoints.

Methods: Data were derived from the Adelphi Real World PsA Plus Disease Specific Programme™, a point-in-time, real-world study of rheumatologists

Table 1. Physician- and patient-reported clinical outcomes of patients prescribed ixekizumab

Outcome	Sample (n=90)	Baseline	Data Collection	p-Value
Physician-Reported Outcomes				
Presence of Symptoms†, n (%)	88	63 (71.59)	30 (34.09)	<0.0001
Tender joints		60 (68.18)	15 (17.05)	<0.0001
Swollen joints		21 (23.86)	4 (4.55)	0.0001
Enthesitis		26 (29.55)	5 (5.68)	<0.0001
Dactylitis		10 (11.36)	3 (3.41)	0.0156
Inflammatory back pain		10 (11.36)	4 (4.55)	0.0313
Persistent lower back pain		37 (42.05)	17 (19.32)	0.0001
Stiffness in the morning		32 (36.36)	17 (19.32)	0.0003
Fatigue/exhaustion				
Asymptomatic Patients, n (%)	88	0 (0.00)	22 (25.00)	<0.0001
Disease Severity, n (%)	85			
Mild		1 (1.18)	69 (81.18)	<0.0001
Moderate		65 (76.47)	15 (17.65)	
Severe		19 (22.35)	1 (1.18)	
Physician-recorded patient pain (0-10 VAS)‡, mean (SD)	84	5.60 (1.46)	1.94 (1.83)	<0.0001
Physician-recorded patient fatigue (0-10 VAS) ‡, mean (SD)	77	4.74 (2.38)	1.92 (1.87)	<0.0001
Patient-Reported Outcomes				
Disease Severity, n (%)	89			
Mild		2 (2.25)	71 (79.78)	<0.0001
Moderate		52 (58.43)	15 (16.85)	
Severe		35 (39.33)	3 (3.37)	
Pain (0-10 VAS) ‡, mean (SD)	84	6.15 (1.97)	2.11 (2.06)	<0.0001

SD: standard deviation; VAS: visual analogue scale

Baseline: characteristics at initiation of ixekizumab treatment

Data collection: characteristics at the time of data collection

†Symptoms selected from wider list (dactylitis, enthesitis, sacroiliitis identified by x-ray, sacroiliitis identified by MRI, spinal fusion, joint inflammation, joint stiffness, inflammatory back/hip/buttock pain, alternating buttock pain, tendonitis, synovitis, arthritis, uveitis/iritis, stiffness in the morning, pain worsening on movement/activity, nocturnal pain, pain at rest, persistent lower back pain, persistent neck pain, persistent thoracic pain, chest wall pain, pain associated with morning stiffness, fatigue/exhaustion, sleep disturbance, nocturnal wakening, psoriasis, inflammatory bowel disease, loss of movement/loss of spinal mobility, loss of grip, osteoporosis of the spine, none of the above, don't know).

‡Pain and fatigue were measured on 0-10 visual analogue scales, where 0 = none and 10 = worst possible.

and their consulting patients with PsA prescribed ixekizumab in the United States in 2022. Rheumatologists provided patient demographic information, treatment history, clinical status, and rheumatologist-perceived disease severity. Adult patients with active PsA receiving ixekizumab at data collection provided information on disease severity and pain. Analyses were conducted with both patient and physician-reported outcomes at ixekizumab initiation (baseline) and data collection. Clinical status at baseline and data collection were compared using paired *t*-tests for continuous variables, chi-squared tests for categorical variables, and Wilcoxon signed-rank tests for directional categorical variables. Physician-patient alignment was analyzed by weighted Kappa analyses, interpreted using Cohen's Kappa Statistic interpretation scale.

Results: In total, 23 rheumatologists provided data for 90 patients with PsA who were receiving ixekizumab at time of data collection. Mean duration of ixekizumab exposure was 12.51 (SD 11.16) months. Patients experienced a mean of 5.61 (SD 3.34) symptoms at baseline, decreasing to 3.12 (SD 3.10) at data collection ($P < 0.0001$) (Table 1). Further, none of the patients were asymptomatic at baseline, which increased to 25.00% at data collection ($P < 0.0001$). Disease severity, reported by both patients and their physicians, significantly decreased between baseline and data collection ($P < 0.0001$), with the proportion of patients experiencing mild disease increasing from 1.18% to 81.18% and 2.25% to 79.78% according to physicians and patients, respectively. Fair physician-patient alignment was observed on disease severity at baseline (kappa = 0.2527); with moderate alignment observed at data collection (kappa = 0.4554). Patients' mean physician-recorded pain also significantly decreased from 5.60 (SD 1.46) at baseline to 1.94 (SD 1.83) at data collection ($P < 0.0001$). Physician-records and patients showed fair alignment on perceived pain at baseline (kappa = 0.3328); and substantial alignment at data collection (kappa = 0.6432). Mean physician-recorded fatigue scores also significantly decreased from 4.74 (SD 2.38) at baseline to 1.92 (SD 1.87) at data collection ($P < 0.0001$).

Conclusion: Rheumatologists and their patients with PsA reported significantly improved outcomes after ixekizumab use relative to baseline. Additionally, both patients and physicians were well-aligned on patients' pain and disease severity, with alignment improving from baseline to data collection.

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A Qualitative Analysis of the Barriers and Facilitators of a Behavioral Weight Management Program for Patients With Psoriatic Arthritis (PsA) and Comorbid Obesity: Part I of the Small Changes for Psoriatic Arthritis Study

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Objectives: Psoriatic Arthritis (PsA) is an inflammatory autoimmune disorder that affects roughly 90,000 Canadians. Patients with PsA are at a high risk of comorbid obesity (ie, BMI ≥ 30 kg/m^2), present in 44% of cases.[1] While weight-loss is known to help alleviate symptom burden and improve medication response and quality of life in patients with PsA and comorbid obesity,[2] few studies have investigated behavioral weight-loss treatment (BWLT)[3] in patients with PsA to support sustained weight-loss over time. Aims: The present study represents part one of a series of early-phase studies. The primary aim is to explore barriers, facilitators, and preferences of patients with PsA and obesity regarding participating in a BWLT, using a qualitative-descriptive approach.

Methods: Participants: Adults (18+) with diagnosed, symptomatic, PsA and obesity (BMI ≥ 30 kg/m^2) were recruited from an outpatient rheumatology clinic in Penticton, British Columbia and invited to participate in a one-on-one interview with a researcher to provide their perspectives on a BWLT designed to meet the needs of PsA patients. Interview Procedures: A semi-structured interview guide was used to ask open-ended questions designed to elicit patients' barriers, enablers, and perspectives regarding participating in a BWLT. Interviews were audio-recorded and transcribed verbatim. Analysis: Interviews were analyzed using conventional content analysis to derive meaning units, categories, and themes from the data.

Results: Twenty participants (11 women; 79% White; mean age 57 years ± 2.80; mean BMI = 34.13 ± 5.27 kg/m^2) completed interviews. Overall, four themes and eleven subthemes emerged from the data: (1) Negative Past Experiences with a BWLT (subthemes: concerns surrounding restrictive diets, troubles maintaining weight-loss), (2) PsA Symptoms as Barriers to BWLT (subthemes: PsA interfering with health behaviors, fatigue and pain interfering with activity levels), (3) Acceptability of Proposed BWLT (subthemes: acceptability surrounding the program content, virtual delivery, group-based format), (4) Program Preferences and Needs (subthemes: flexibility with scheduling, informational support about PsA, and cost barriers).

Conclusion: Impact/Future Directions: Results are being used to develop a BWLT tailored to meet the needs of patients with PsA, and inform a subsequent, feasibility trial comparing weight-loss among patients who receive the BWLT, relative to wait-list controls. Future directions include situating collected data within the Theoretical Domains Framework. Supported by a CIORA grant. References: [1.] Ernste F. Arthritis Care Res 2015;67:1015-21. [2.] Singh J. Arthritis Rheumatol 2019;71:5-32. [3.] Lutes L. Ann Behav Med 2008;35:351-357.

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Early Clinical Improvement as Predictor of Long-Term Health-Related Quality of Life in Psoriatic Arthritis Patients Treated With Guselkumab: Post Hoc Analysis Through 2 Years of a Phase 3 Study

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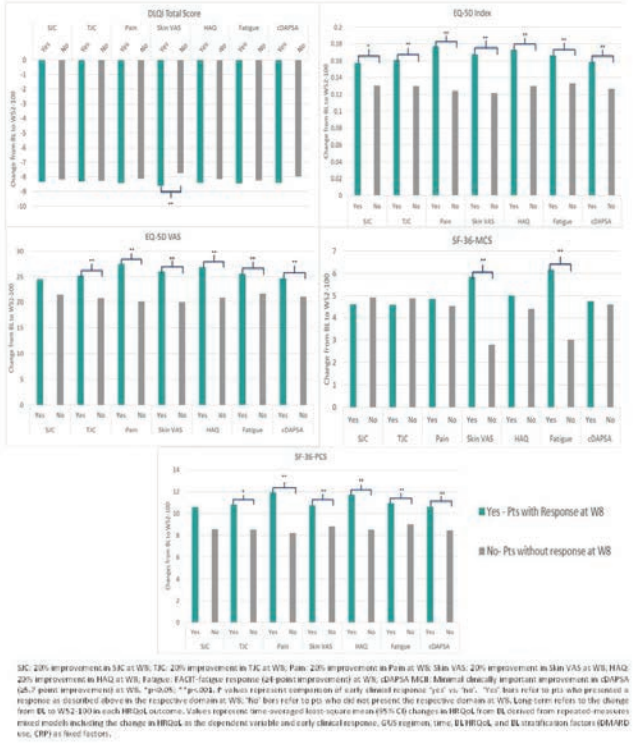
Objectives: Patients (pts) with PsA experience lower quality of life than the general population. PsA treatment recommendations highlight the importance of maximizing long-term (LT) health-related quality of life (HRQoL) and social participation as primary goals of therapy. We aimed to determine whether early clinical improvement with guselkumab (GUS) predicts future attainment of enhanced HRQoL.

Figure: Associations Between Early (W8) Clinical Improvement in GUS-Treated Patients and Long-Term (W52-100) HRQoL



SJC: 20% improvement in SJC at W8; TJC: 20% improvement in TJC at W8; Pain: 20% improvement in Pain at W8; Skin VAS: 20% improvement in Skin VAS at W8; HAQ: 20% improvement in HAQ at W8; Fatigue: FACIT-fatigue response (≥4-point improvement) at W8; cDAPSA MCII: Minimal clinically important improvement in cDAPSA (≥5.7 point improvement) at W8; *p<0.05, **p<0.01. P values represent comparison of early clinical response 'yes' vs. 'no'. 'Yes' bars refer to pts who presented a response as described above in the respective domain at W8; 'No' bars refer to pts who did not present the respective domain at W8. Long-term refers to the change from BL to W52-100 in each HRQoL outcome. Values represent time-averaged least-square means (95% CI) changes in HRQoL from BL derived from repeated-measures mixed models including the change in HRQoL as the dependent variable and early clinical response, GUS regimen, time, BL HRQoL, and BL stratification factors (DMARD use, CRP) as fixed factors.

Methods: DISCOVER-2 enrolled adults naïve to biologics/JAK inhibitors with active PsA3. 739 pts were randomized (1:1:1) to GUS 100 mg at W0, W4 and then every 4 weeks (Q4W; n = 245) or Q8W (n = 248); or placebo (PBO; n = 246). This post hoc analysis, pts treated with GUS were pooled. Early (W8) clinical improvement was defined as any of: (i) ≥ 20% improvement in SJC, TJC, pt pain, pt skin visual analog scale (VAS), and HAQ-DI; (ii) ≥ 4-point improvement in the Functional Assessment of Chronic Illness Therapy (FACIT)-Fatigue score; (iii) minimally clinically important improvement in clinical disease activity in PsA (cDAPSA; ≥ 5.7 points); (iv) change from BL in Leeds enthesitis index and dactylitis severity score (DSS). Time-averaged changes in HRQoL estimates from BL to W52-100 were determined for Dermatology Life Quality Index (DLQI), EQ-5D Index & VAS, and SF-36 mental (MCS) and physical (PCS) component summary scores. The association between early clinical improvement at W8 and LT HRQoL among GUS-treated pts was assessed with mixed models.

Results: Clinical improvement by W8 was significantly greater among GUS-treated patients compared with PBO. W8 improvement with GUS was associated with greater increase in HRQoL (EQ-5D) at W52 through W100, except for SJC on EQ-5D VAS (Figure). Similarly, pts achieving early clinical improvement in any domain except DSS and SJC experienced significantly greater benefits in physical function (SF-36 PCS) at W52-W100. Early improvements in skin disease and fatigue were associated with greater improvement in mental health (SF-36 MCS) at W52-W100, while for skin-specific HRQoL (DLQI), early pt skin VAS response was the only predictor of HRQoL at W52-W100. Although significantly lower than in pts with early clinical improvement, benefits in HRQoL were also observed in pts without clinical improvement at W8.

Conclusion: Clinical response at W8 with GUS was associated with significantly greater improvements in HRQoL from W52-W100. Although pts without early clinical improvement demonstrated benefits in LT HRQoL, early response in distinct PsA domains differentially impacted more specific aspects of HRQoL over 2 years. In contrast, significantly greater improvements in overall and physical HRQoL were observed among responders across several PsA domains.

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Effect of Upadacitinib and Adalimumab on Residual Pain Among Patients With Psoriatic Arthritis Whose Inflammation Was Attenuated After Three and Six Months of Treatment

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Objectives: To evaluate the efficacy of upadacitinib (UPA), adalimumab (ADA), and placebo (PBO) on residual pain in patients with psoriatic arthritis (PsA) who had attenuation of inflammation.

Methods: The SELECT-PsA 1 study enrolled adults with active PsA with prior inadequate response or intolerance to ≥ 1 non-biologic DMARD. Randomization arms included UPA 15 mg once daily (QD), ADA 40 mg every other week, and PBO. Subgroup assessment was conducted between patients with attenuation of inflammation vs remaining inflammation at week 12 and week 24. Attenuation of inflammation was defined as swollen joint count based on 66 joints (SJC66) of 0 and CRP levels < 6 mg/L. Mean change from baseline in Patient's Global Assessment (PGA) of pain at week 12 and week 24 as well as ≥ 30%, ≥ 50%, or ≥ 70% reduction from baseline to week 12 and week 24 in PGA of pain were assessed. Patients who received rescue therapy after week 16 were excluded from the week 24 analysis.

Results: Attenuation of inflammation at week 24 was reached by 169 (48.1%), 144 (42.0%), and 66 (24.5%) patients receiving UPA, ADA, and PBO, respectively. Some differences in baseline characteristics were observed between treatment groups in the attenuation of inflammation group, especially in CRP levels (Table). Among these patients, mean (95% CI) PGA of pain improved more for UPA (-3.8 [-4.2, -3.5]) and ADA (-3.6 [-3.9, -3.2]) vs PBO (-2.8 [-3.3, -2.3]) at week 24. Absolute mean values for PGA dropped from 6.2 at baseline to 2.2 at week 24 with UPA. For ≥ 30%, ≥ 50%, or ≥ 70% reduction in PGA of pain from baseline, response rates with UPA and ADA were higher than PBO at weeks 12 and 24. Among patients with remaining inflammation, a similar trend was observed across endpoints at weeks 12 and 24.

Conclusion: After 24 weeks, nearly half of the patients treated with UPA had attenuation of inflammation. In these patients, mean PGA of pain dropped from 6.2 at baseline to 2.2 at week 24, close to the ≤ 2.0 threshold

Table. Baseline Characteristics Among Patients With Attenuation of Inflammation at Week 24

	Placebo n=66	Adalimumab 40 mg EOW n=144	UPA 15 mg QD n=169
Age, years, mean (SD)	51.1 (13.7)	49.7 (12.7)	49.8 (11.7)
Female, n (%)	35 (53.0)	56 (38.9)	73 (43.2)
Duration of PsA symptoms, years, mean (SD)	10.3 (9.6)	9.3 (8.9)	9.3 (8.7)
SJC66, mean (SD)	8.4 (5.3)	10.3 (8.3)	10.3 (7.7)
CRP, mg/L, mean (SD)	5.6 (8.3)	11.0 (16.5)	12.8 (18.2)
Patient assessment of pain (NRS), mean (SD)	6.0 (2.3)	5.7 (2.2)	6.1 (1.9)
Co-medication use, n (%)			
NSAIDs	35 (53.0)	90 (62.5)	104 (61.5)
Corticosteroids	14 (21.2)	27 (18.8)	20 (11.8)

ADA, adalimumab; NRS, numerical rating scale 0–10; PBO, placebo; PsA, psoriatic arthritis; SJC66, swollen joint count based on 66 joints; UPA, upadacitinib.

representing when satisfaction with health is not negatively affected by pain. Both UPA and ADA showed a higher response rate vs PBO. These results suggest that both UPA and ADA are effective in reducing residual pain in PsA patients over 6 months.

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Effectiveness of Upadacitinib in Patients With Rheumatoid Arthritis in Canadian Real-World Practice: Interim Results From the CLOSE-UP Post-Marketing Observational Study

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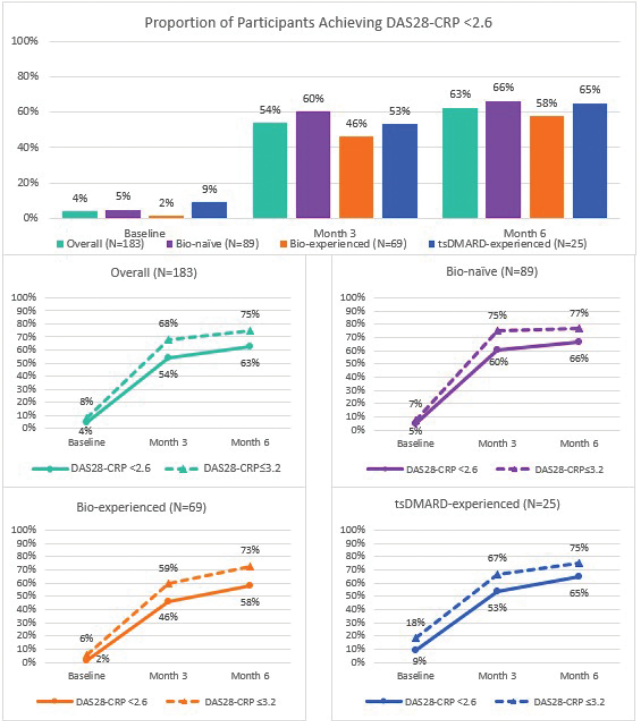
Objectives: Upadacitinib (UPA) is an oral, selective Janus kinase (JAK)-inhibitor that has been shown to be effective and well-tolerated in patients with rheumatoid arthritis (RA) in the Phase 3 SELECT clinical trials and was approved in Canada as a treatment option for RA in December 2019. The Canadian Real-Life post-marketing Observational Study assessing the Effectiveness of UPadacitinib for treating rheumatoid arthritis (CLOSE-UP) study initiated in 2020 aims to investigate the effectiveness of UPA across 390 Canadians including csDMARD, bDMARD and tsDMARD-experienced real-world RA patients.

Methods: CLOSE-UP is an ongoing, prospective, multicenter, observational post-marketing study in adults with moderate-to-severe RA who are treated with UPA 15 mg once daily, with the decision to initiate UPA made prior to study participation. Participants are followed for 24 months following UPA initiation with data collected at routine visits. The primary endpoint is the proportion of participants achieving a Disease Activity Score - 28 Joint Count, C-reactive protein (DAS28-CRP) < 2.6 at 6 months. Secondary endpoints include, pain score using a visual analog scale, fatigue (FACIT-F), physical function as measured by the Health Assessment Questionnaire (HAQ) and other assessments of disease activity including Clinical Disease Activity Index (CDAI) score. Per protocol, eligible subjects are grouped by prior/most recent exposure to: no b/tsDMARDs (bio-naïve); ≤ 2 bDMARDs but no tsDMARD (bio-experienced), and ≤ 1 bDMARD followed by a tsDMARD (tsDMARD-experienced). This descriptive interim analysis reports data for participants who had completed their 6-month visit by March 18, 2022. Data are presented as observed and summarized descriptively, with no statistical analyses conducted.

Figure 1. Proportion of Participants Achieving DAS-CRP <2.6 or ≤3.2 by Study Visit



Bio-naïve: has not been previously exposed to any bDMARD or tsDMARD. Bio-experienced: has not been previously exposed to tsDMARD and has been previously exposed to ≤2 bDMARDs. tsDMARD-experienced: has been previously treated with one tsDMARD and ≤1 bDMARD prior to treatment with that tsDMARD. % is based on number of subjects with available data at each visit within the group. DAS28-CRP remission: score <2.8; LDA: score ≤3.2. b, biologic; CRP, C-reactive protein; cs, conventional synthetic; DAS28, Disease Activity Score – 28 Joint Count; DMARD, disease modifying antirheumatic drug; LDA, low disease activity; ts, targeted synthetic.

Results: Of the 183 participants included in this interim analysis, 89 (49%) were bio-naïve, 69 (38%) were bio-experienced and 25 (14%) were tsDMARD-experienced. Overall, 63% of patients achieved a DAS28-CRP < 2.6 (primary endpoint; Figure 1) The proportion of participants achieving DAS28-CRP < 2.6 at the 6-month visit was similar between those receiving UPA monotherapy (62.2%, n = 69/111) and those receiving UPA in combination with a csDMARD (63.9%, n = 36/45). Physical function and patient-reported outcomes including pain and fatigue improved over the first 6 months following UPA initiation. The safety profile of UPA was consistent with that seen in Phase 3 trials with no new safety signals.

Conclusion: Consistent with clinical trial data, interim analysis of this real-world Canadian study showed that disease activity was reduced, and patient-reported outcomes improved with an overall favorable benefit: risk profile for Canadian patients receiving UPA in the real-world setting.

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Characteristics of a Tele-Rheumatology Shared-Care Model: Leveraging the Expertise of an Advanced Clinician Practitioner in Arthritis Care (ACPAC)-Trained Extended Role Practitioner (ERP) in Rural-Remote Ontario

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Objectives: A dearth of Rheumatologists has resulted in significant gaps in inflammatory arthritis (IA) care nationally. Lack of rheumatologic access in rural-remote communities further exacerbates these systemic deficiencies, and portends a poor prognosis. As there are no viable strategies to meaningfully increase the number of Rheumatologists practicing rurally, alternate effective and sustainable strategies must be harnessed. The value of, and myriad potential roles for, an ACPAC-ERP are well-established. In this retrospective chart review, the impact of a shared-care model utilizing an ACPAC-ERP, on site, in collaboration with a Rheumatologist working remotely is described.

Methods: A single Rheumatologist (Hub-St. Michael's Hospital) and an ACPAC-ERP (Spoke- Espanola Family Health Team) established a monthly tele-Rheumatology clinic to care for suspected-IA patients between January 2013 and January 2022. A comprehensive initial assessment (including history, joint exam, and patient-reported outcomes) was conducted and documented by the ACPAC-ERP. Relevant investigations were completed prior to the tele-Rheumatology visit. Subsequent collaborative visits were conducted with the Rheumatologist attending virtually. Demographics, time-to-visits, patient-reported outcomes and objective clinical data were analyzed retrospectively.

Results: Data from 124 patients were collected. 98.4% (n = 496) of the 504 visits studied were exclusively virtual. Average patient age at first visit was 55.6 years and 75.8% were female (Table 1). Of 124 patients triaged, 80 (64.5%) were confirmed as having IA during their first Rheumatologist visit (36 rheumatoid arthritis, 10 psoriatic/reactive arthritis, 16 connective tissue disease [CTD], 7 ankylosing spondylitis, 7 gout, 4 polymyalgia rheumatica/vasculitis). At last visit, 75% had the same diagnosis as

Table 1: Descriptive Characteristics of ALL Tele-Rheumatology Patients

	n=124
Age at first Rheumatologist visit, years	
Mean (SD)	55.6 (16.2)
Sex n=124 (%)	
Female	94 (75.8%)
Male	30 (24.2%)
Visits n=504	
Total Range	1-20
Total Mean (SD)	3.98 (3.9)
Range tele-Rheum Visits	1-20
Mean tele-Rheum Visits (SD)	4.0 (4.0)
In-person visits (Range)	n=8 (0-1)
Mean in-person Visits (SD)	0.06 (0.25)
Days from Referral to ERP Assessment n=113 (%)	
Range	0-182
Mean (SD)	52.5 (43.5)
<90 days	n=91, 80.5%
>91 days	n=22, 19.5%
Days from ERP Assessment to Visit with Rheumatologist n=92 (%)	
Range	0-290
Mean (SD)	64.5 (57.7)
<90 days	n=70, 76.1%
>91 days	n=22, 23.9%
Billing codes at first visit n=123 (%)	
RA(714)	36 (29.2%)
CTD (710)	16 (13.0%)
OA (715)	13 (10.6%)
PSA (721)	10 (8.1%)
Gout (274)	7 (5.7%)
AS (720)	7 (5.7%)
Vasculitis/PMR (447/725)	4 (3.3%)
Billing code diagnoses n=121 (%)	
Stayed the same	93 (75.0%)
Changed	22 (17.7%)
Only had one consult	6 (4.8%)

at the first visit. Mean time from primary care referral to ACPAC-ERP assessment was 52.5 days (80.5% less than 90 days), and mean time from ACPAC-ERP assessment to virtual rheumatology visit was 64.5 days (76.1% less than 90 days).

Conclusion: There is only one ERP working with multiple adult Rheumatologists, servicing an ethnically diverse population of 565,000 people, spanning 400,000 square kilometers in the North East Local Health Integration Network. This is the first description of a shared care ACPAC-ERP/Rheumatologist virtual clinic assessing patients with suspected IA/CTD in rural/remote Ontario. A high proportion among those with suspected IA saw a Rheumatologist in less than 90 days after triage and preliminary work-up by the ACPAC-ERP. This tele-Rheumatology shared-care model utilizing an ACPAC-trained ERP, demonstrates a viable strategy to address gaps in care for patients with suspected IA in rural-remote Ontario.

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"How Are You?" A Thematic Analysis of Patient Experiences and Perspectives Using Text-Messaging Based Care

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Objectives: Delays in rheumatoid arthritis care can be attributed to mismatches between patient needs and care, in addition to a limited rheumatology workforce. Virtual care modalities are increasingly used to support timely patient care. WelTel is a short message service (SMS) text-based platform, connecting patients with their healthcare providers via asynchronous

Table 1. Themes, description, and supporting quote for themes.

Quality of Care Theme	Representative Patient Quotations
Patient-centered care Description: Text-messaging based care allowed patients to choose when and how they would like to communicate with their rheumatology team.	*"I felt that, um, you know, I was safe, eh, posing the questions, that, you know, I wasn't, um, say, offending anybody or saying things I shouldn't say or, you know, approaching the platform in strange ways. Like, it just seemed very sort of intuitive and natural like a conversation." (Patient 1, female, 47 years, large population centre)* *"Oh, are you kidding? I- I love this. This is way better than try-trying to make an appointment and then, you know, go to the appointment eh, just to sit there and say you're fine. No, no, no. If this, if eh, if I can do this instead of appointments, that would be fine." (Patient 2, female, 61 years, large population centre)*
Equitable communication Description: Text-messaging based communication allowed those from varying backgrounds to connect with their rheumatology team.	*"Um, where I live at least, I live a little bit outside the city, so my calling signal's a little bit weaker. And texting is just so much more efficient for me as well, cause I'm usually always on the go. So to text, if I'm driving, I can usually just park and do that. Calling, I feel like I have to really be, like, in present with the conversation." (Patient 3, female, 21 years, large population centre)*
Reliable information Description: Patients received reliable information sent out by their rheumatology team regarding rheumatoid arthritis and COVID-19.	*"No, I just got used to it being [healthcare provider]. Of course, in the tagline, it said pharm assistant. Again, a highly trained professional, another great knowledgeable person. If it was a nurse, again, highly trained knowledgeable, but I, uh, just probably figured whoever it was, if they didn't know the answer, they would, uh, go find it." (Patient 1, female, 47 years, large population centre)*
Efficient use of resources Description: Patients used WelTel to address minor issues, allowing for efficient use of available resources.	*"Well, if I thought that having WelTel would free up the doctor's time so I wouldn't have to book an appointment a year in advance? Heck yeah. Because you- you- you don't know. I- I- I might need him long before that and he's booked solid for six months, which again, doesn't help. But if- if everyone's freeing up his time by using WelTel, then, and he's got like, availability for new patients as well as you know, people that are like eh, having some sort of flare, that-that would be much better, I would think." (Patient 2, female, 61 years, large population centre)*
Timely communication Description: Text-messaging based care allowed patients to get faster access to their rheumatology team, reducing wait times.	*"Uh, it, it's much faster. It's clearer. Uh, well, you can go back and read it again as well. Uh, you know, if you, if you say, "What, what was that again?" You know? Um, but, uh, calling the clinic, I know that things have changed. Staffing is different, there's been cuts and everything else. So when you call the clinic now, you never, you, you leave a message. And you've got a 48-hour window to get an answer. Which is a bit long, if you're concerned. And I don't know how that works out for ... I mean, I understand the stress that everybody's under in the office these days." (Patient 4, female, 63 years, large population centre)* *"I like the part of being able to just fire off a question, and get an answer back, without having to bother somebody on the phone, and wait for an answer." (Patient 5, female, 57 years, rural population centre)*

text messaging. This platform has proven to improve treatment experiences in chronic health conditions (eg, HIV and asthma). To better meet patient needs between clinic visits, a pilot study was conducted using WelTel. The objective of the present study was to understand perspectives and experiences of patients after the WelTel pilot.

Methods: The WelTel pilot launched in September 2021 with 70 patients enrolled in the pilot which involved monthly, "How are you?" check-ins with their rheumatology team over a 6-month period. Patients were also able to begin conversations using the platform. After the pilot, 39 patients were invited to participate in semi-structured interviews. Sex at birth, gender, age, race, and location were collected and used to conduct purposive sampling to ensure variety of perspectives. Qualitative descriptive methodology was used to explore patient perspectives and experiences. An interview guide was developed using the Six Domains of Health Care Quality (safety,

efficacy, patient-oriented, timely, efficient, equitable) proposed by the Institute of Medicine, aiming to capture whether this model of care met the standards outlined. Additional participants were interviewed until no new themes emerged. A primary qualitative researcher coded interviews using NVivo, with weekly meetings to review transcripts and confirm themes and subthemes. Data analysis was guided by Braun & Clarke's technique for thematic analysis, using a semi-deductive approach with pre-determined themes being drawn from the six domains of quality care and allowing for additional new themes to emerge.

Results: Thirteen patients (61.5% female) were interviewed, with a median age of 62 (7). Most interviewees identified as White (n = 10), and all but one was from a large urban center. The most prominent theme, determined by counting codes, was that text-based messaging contributed to better patient-centered care. Data also revealed themes of timely and equitable communication with rheumatology team, reliability of information, and efficient use of resources. Descriptions and supporting quotes for each theme are displayed in Table 1.

Conclusion: Patients perceived that this platform facilitated timely communication leading to better patient-centered care. Ongoing work is being done to examine provider perspectives and experiences regarding WelTel and to review early implementation outcomes.

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The Presence of Non-inflammatory Articular Pain is Associated With Work Impairment, Worse Function and Health-Related Quality of Life Outcomes in Patients With Early RA Participating in a Prospective Observational Real-World Canadian Early Inflammatory Arthritis Cohort

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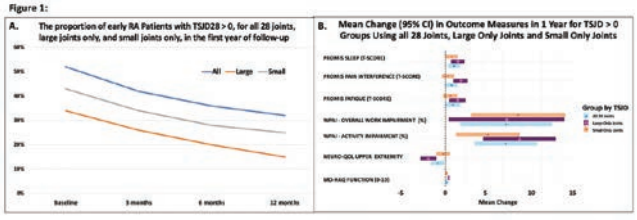
Objectives: Disproportionate articular pain without palpable synovitis likely represents hyperalgesia due to articular and/or centralized pain, which may be mediated by RA-linked cytokines. It is often, described as "non-inflammatory pain (NIP)" and can be identified using elevations in tender-swollen joint count differences (TSJD). NIP can overestimate composite disease activity scores, and limit remission designation. Our objectives were to describe the prevalence of NIP using TSJD as a proxy in real-world early RA patients across Canada, identify associations with patient-reported outcomes, and explore differences between large vs small-joint TSJDs.

Methods: We analyzed baseline, 3-, 6- and 12-month data from patients with active, rheumatologist-diagnosed, early RA (symptoms < 1 year, CDAI > 2.8) enrolled in the Canadian Early Arthritis Cohort (CATCH) study [Jan/2016-August/2022]. Patients were divided as NIP present/absent (TSJD scores > or ≤ 0) on 28 joints. Pain distribution was assessed for large and small-joints separately. Outcome measures included function (MDHAQ (0-10), Neuro-QoL T-scores), % work productivity activity impairment (WPAI-RA), and HRQoL (PROMIS-29 Domain T-scores). Mean (95%CI) changes in outcomes were calculated for pain-distribution subgroups. Adjusted associations between repeat measures of TSJD and function, work and HRQoL, respectively, were estimated using linear-mixed models adjusting for age, sex, education, smoking, comorbidities, osteoarthritis/back pain, CDAI and treatment.

Figure 1:



Results: The sample included 547 early RA patients (70% female, mean (SD) age 56 (15) years, symptom duration 5 (3) months). About half, [287 (52%)] of patients' baseline TSJD was >0. Compared to patients without NIP, those with NIP at enrollment were more likely to report higher % work impairment (49.4 vs 40.1), higher % activity impairment (57.2 vs 47.3), and worse PROMIS domain and Neuro-Qol T-scores: worse anxiety (54.7 vs 51.7), depression (53.5 vs 50.4), and sleep problems (55.4 vs 51.6); higher pain interference (61.8 vs 59.1), and worse Neuro-QoL upper extremity function (35.9 vs 40.1). NIP prevalence decreased from baseline to 12 months (Total NIP: 52% to 32%; large-joint NIP 43% to 25%; small-joint NIP: 34% to 15%) (Figure 1). NIP was significantly associated with worse mean-change scores for function, work, fatigue and sleep (Figure 1); mean-change scores were numerically larger for large-joint NIP.

Conclusion: Over half of early RA patients have NIP at baseline, that can persist in up to 30%. Having NIP is associated with worse function, work and activity impairment, and HRQoL over 1-year of follow-up. NIP assessment, especially in large-joints may help identify patients likely to experience worse outcomes. The impact from and persistence of NIP supports a need to identify early interventions.

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Assessing the Diversity of Rheumatoid Arthritis Participants in the Rheum4U Precision Health Registry Cohort

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Objectives: To assess the diversity of the Rheumatoid Arthritis (RA) participant population enrolled in Rheum4U Precision Health Registry (Rheum4U) and compare to the general and RA population of Alberta.

Methods: Rheum4U is a longitudinal study that uses a web-based platform to enroll patients with suspected/confirmed inflammatory arthritis and collect prospective data at two adult rheumatology clinics in Calgary, Alberta served by a centralized referral and intake program for Southern Alberta.[1] All consenting RA participants who completed a demographics form upon entry into the cohort between August 2016 and June 2022 were included. Participants reported date of birth, biological sex, postal code, ethnicity, total yearly household income, highest level of education completed and marital status. Percent of participants with each demographic descriptor is presented. RA data for Alberta was extracted from a previous published study.[2] Alberta population data was extracted from Statistics Canada Census 2016.[3]

Results: 776 Rheum4U participants were included in the analysis. The mean age upon entry into the cohort was 56 years old (SD 14 years) and the mean age at diagnosis was 47 years old (SD 15 years). Of the 74% of participants who reported their income, 37% had a total yearly household income of < $67,000. 37% had an income of ≥ $67,000 and < $128,000. 26% had an income of ≥ $128,000. The median income of Albertans is $93,835 (Table 1). Demographics of Rheum4U participants

	Rheum4U	RA Alberta	Alberta
Female (%)	74	68	
Ethnicity			
European (%)	77		66
Asian (%)	9		19
First Nations and Inuit (%)	6		8
African (%)	1		4
Latin American (%)	1		2
Education			
Bachelor's degree or higher (%)	37		28
High school certificate or no certificate/diploma/degree (%)	26		36
Apprenticeship/trades certificate/college, or degree below Bachelor level (%)	37		35
Marital Status			
Married/common law (%)	71		60
Single (%)	15		27
Separated/divorced/widowed (%)	15		13
Residence [4]			
Metro or moderate metro influence (%)	80	60	
Urban or moderate urban influence (%)	7	13	
Rural center area, rural or rural remote (%)	13	27	

with RA and comparison to Alberta RA population or general Alberta population.

Conclusion: Rheum4U captures a diverse cohort of participants with RA, reflecting the characteristics of the population of Alberta. The percent of patients from rural communities is low which needs further evaluation to determine if this reflects patients not being seen by rheumatology or our cohort. This identifies a potential issue of equity based on geography.

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Women With Early Rheumatoid Arthritis Less Likely to Achieve Rapid and Sustainable Remission: Results From The Canadian Early Arthritis Cohort Study

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Objectives: To compare early, and sustained remission in men and women with early rheumatoid arthritis (ERA) receiving guideline-based care in rheumatology clinics across Canada.

Methods: Data were from patients with ERA (symptoms < 1 year) enrolled in the Canadian Early Arthritis Cohort (CATCH) study between 2007 and 2019. Participants completed standardized study visits including detailed RA clinical assessments, patient-reported outcomes, and laboratory investigations every 3 months in the first year, every 6-months in the second year and annually thereafter mirroring real-world care practices in Canada. Treatment decisions were at the discretion of the treating rheumatologist in line with treat-to-target guidelines. Descriptive statistics were used to summarize and compare prevalence of SDAI remission (< 3.3), median time to SDAI remission and sustained SDAI remission 12- and 24- months after first remission across men and women. Multivariable multinomial regression was used to identify predictors of minor flares (SDAI REM→LDA) and major flares (SDAI REM→MDA/HDA) over 24-months follow up from first remission.

Results: The sample included 2743 ERA patients (1933 women; 789 men).

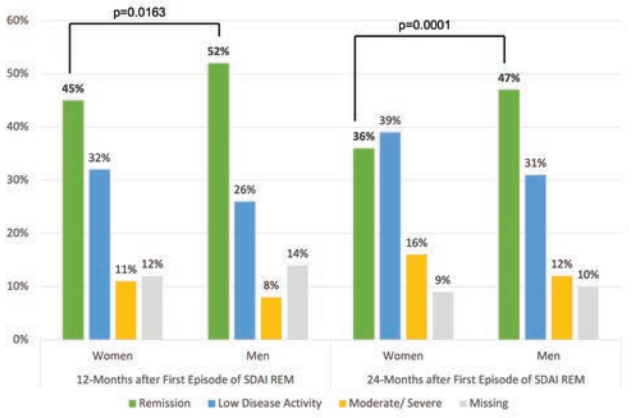

Figure. SDAI Disease Activity Status in Women and Men with Early Rheumatoid Arthritis 12- and 24 Months after First Reaching Remission

At enrollment, mean (SD) SDAI was high at 27.4 (14.6); most patients were treated with csDMARDs (92%), predominantly with MTX (77%) and 29% with oral steroids. Disease activity and treatment strategies did not differ between men and women at enrollment. Overall prevalence of SDAI remission over the study follow up was similar across men (64%) and women (61%), however median time to remission was longer for women vs men (19.2 months vs 16.1 months, $P = 0.0358$), and a lower proportion of women vs men reached early remission targets by 12-months (37% vs 43%, $P = 0.0054$). Sustained remission 12- and 24 months after first remission was also higher in men vs women (Figure). Predictors of minor and major flares after remission differed by sex. Smoking, seropositivity and residual disability at first SDAI remission predicted flares in men, while obesity, comorbidities and higher SDAI at first remission predicted flares in women. Treatment with advanced therapy at first remission was associated with lower likelihood of flares after remission in women.

Conclusion: This large longitudinal study of ERA patients receiving contemporary guideline-based care showed high overall rates of SDAI remission for men and women over the study period, however there were notable sex differences favoring men in the rapidity and sustainability of remission. Results point to smoking and residual disability at remission in men, and obesity and chronic comorbidity management in women as potentially modifiable targets for sustaining remission.

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Consideration of Patient Perspective is Key When Planning RA Trials: A Focus Group Study

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Objectives: Effective treatment of rheumatoid arthritis (RA) involves early, aggressive use of disease-modifying antirheumatic drugs (DMARDs) and advanced therapies (biologics, small molecules). Unfortunately, biomarkers to guide personalized treatment for individual patients are lacking. We are planning a randomized clinical trial (RCT) to explore novel biomarkers to personalize therapy. We undertook this qualitative study to investigate patient perspectives regarding randomized and personalized RA care.

Methods: We conducted virtual focus groups with RA patients to discuss the idea of a pragmatic trial of advanced RA therapies. Seventeen RA patients were recruited from in-person rheumatology clinics from two major university hospitals. Three moderator-led focus groups (2 in English,

Table 1: Themes and sub-themes of 3 focus groups with rheumatoid arthritis patients

Theme	Sub-themes
Seeking help with decisions	Participants want to discuss their treatments with physicians.
	Participants trusted their rheumatologists' knowledge.
	There is hesitance to disagree with the medical "expert", i.e. their rheumatologist
	However, participants saw themselves as "experts" of their own bodies; they want to use both this self-knowledge and the input and expertise from their doctors to make decisions about their care.
	There is value in speaking to other patients and reading trustworthy sources to learn more about their treatments and side-effects.
Coordination/ communication of medical care	Participants feel the burden of making decisions when their different specialists don't appear to communicate with each other about the individual's treatment plan.
Questions and concerns about medications	Understanding medication side effects is very important to participants when making decisions about medication changes.
	There is hesitance about trying a new medication if it is randomized (in the context of a trial).
	Some participants said that the frequent visits to their clinic for injectable medication administration disrupted their daily lives, while others admitted that it was hard for them to remember to take their daily pills and that injections might overcome that.

1 in French) of 60-90 minutes each were conducted by video conferencing. They were video recorded and transcribed verbatim. Each focus group began with a general introduction to the topics. Then, participants were asked how they felt about treatment randomization in an RCT, drug preferences (injection vs pill, etc.), biomarker-driven treatment decisions (including synovial biopsy), challenges in managing RA, and ways those challenges could be overcome. Two members of the research team read the transcripts and independently coded (labeled and organized) participant statements to identify distinct themes and relationships between these. The two coders then discussed and integrated their work, and identified potential themes corresponding to different aspects of the research questions. Once preliminary themes were agreed on, they were used to refine and organize the coding. At different stages of the analyses, the remaining research team members provided feedback. This process continued until consensus of the two coders was achieved.

Results: Five main themes and 14 subthemes were identified, (Table 1). Trust facilitates treatment discussions between patients and physicians, and could increase acceptance of treatments and novel tests in order to personalize care. Poor communication between physicians was identified as a barrier to optimal personalized care.

Conclusion: Consideration of patients' perspectives is key when planning a trial. Our findings, in conjunction with physician focus group data which remains to be analyzed, will be used to design a pragmatic trial of advanced therapies in RA.

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Patient Mobilization for Vaccine Access and Improved Care During the COVID Pandemic

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Objectives: The COVID pandemic was particularly difficult for persons like me (MCB) living with rheumatoid arthritis and immunosuppressed. I had to impose myself months of isolation and restrictions, live with anxiety, and have a good control of my disease. With the development of new anti-SARS-CoV-2 vaccines came the hope of a way out. However, in December 2020, I learned that immunosuppressed patients would not have access to these vaccines because of the lack of research data. The rationale for this was that the initial vaccine studies had not included patients with autoimmune diseases and there was a theoretical risk of disease exacerbation after vaccination. This seemed like a paradox: refusing to give what might protect vulnerable immunosuppressed persons like me from severe COVID. I felt like I had a right to be part of the discussion!

Methods: With another patient of the Patients Interested in Research in Arthritis (PIRA) group, we decided to mobilize ourselves to help find a solution. The rheumatologist affiliated with PIRA and an infectious disease specialist offered to support us in our call to make vaccines accessible to immunosuppressed patients.

Results: A research project that granted immunosuppressed patients access to vaccination and documented their response to the vaccine was put in place. The team worked fast and hard to establish the protocol, met with officials at the Quebec Ministry of Health where the proposal was submitted and accepted. By May 2021 more than 200 subjects had received two doses of vaccine. The preliminary results showed a lower response to SARS-CoV-2 antibodies in arthritis patients compared to healthy controls after the 1st dose and a better response after the 2nd dose. This encouraged public health authorities to prioritize our population of patients to receive a 3rd dose more rapidly than in the general public. Patients with autoimmune inflammatory diseases had the chance to demonstrate that the vaccine was safe and acceptable in immunosuppressed patients. In addition, a booster dose 3 months after the 3rd dose was available and helpful as the Omicron wave hit hard.

Conclusion: PIRA patients have been supportive, informed, and have shared their fears, difficulties, and hope. We feel that we were listened to and that we made a difference. We thank the rheumatology team who made this project happen in a timely manner. Through this collaborative work, we have helped the autoimmune inflammatory disease patient community. Advocacy is important!

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Time to First Remission and Prevalence of Sustained Remission After Etanercept Biosimilar (ETA-B) or Originator (ETA-O) Initiation in Rheumatoid Arthritis (RA)

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Objectives: The first biosimilar etanercept (ETA-B) was approved in Canada in 2016, but real-world data comparing the effectiveness of ETA-B vs their equivalent originator (ETA-O) remains scarce. We compared time to remission throughout follow-up and sustained RA remission in the first 12 months.

Table 1A – Cox proportional hazard ratios (HR) for time to remission.

Baseline* Characteristics	Unadjusted HR (95% CI)	Adjusted HR (95% CI)ª
Biosimilar etanercept (versus originator)	1.10 (0.69, 1.74)	1.43 (0.65, 3.13)
Female sex	0.76 (0.46, 1.26)	1.03 (0.46, 2.31)
Age at RA diagnosis	1.00 (0.98, 1.01)	0.97 (0.95, 1.00)
Disease duration	0.99 (0.96, 1.01)	0.98 (0.94, 1.01)
Obese (Body mass index≥30)	0.54 (0.28, 1.03)	0.52 (0.25, 0.96)
Current smoker	0.63 (0.31, 1.26)	0.40 (0.14, 1.21)
Moderate or high disease activity	0.64 (0.39, 1.04)	0.59 (0.26, 1.37)
Prednisone**	0.88 (0.53, 1.47)	1.04 (0.47, 2.28)
Methotrexate	1.07 (0.67, 1.69)	0.90 (0.42, 1.93)
Hydroxychloroquine	1.70 (1.05, 2.73)	1.88 (1.00, 4.51)

Table 1B – Logistic regression model: Sustained remission within first 12 months.

Baseline*Characteristics	Unadjusted OR (95% CI)	Adjusted OR (95% CI)ª
Biosimilar etanercept (versus originator)	0.93 (0.39-2.37)	1.16 (0.31-4.74)
Female sex	2.63 (0.84-11.6)	3.35 (0.68-25.8)
Age at RA diagnosis	0.98 (0.96-1.01)	1.00 (0.95-1.05)
RA duration	0.97 (0.91-1.02)	0.98 (0.90-1.05)
Obese (Body mass index≥30)	0.43 (0.13-1.25)	0.40 (0.10-1.40)
Current smoker	1.37 (0.42-3.91)	0.89 (0.18-3.71)
Moderate or high disease activity	1.38 (0.51-4.40)	3.82 (0.57-76.5)
Prednisone**	1.28 (0.48-3.18)	1.28 (0.31-4.95)
Methotrexate	2.01 (0.81-5.50)	2.44 (0.63-11.1)
Hydroxychloroquine	5.00 (1.78-17.9)	4.54 (1.00-34.9)

ª Adjusted for all variables shown. *At etanercept initiation (unless otherwise specified) **Baseline current drugs

Methods: We studied etanercept-naïve RA patients starting ETA-B or ETA-O between January 2015 and May 2022 from three prospective research cohorts related to the RA Pharmacovigilance Program and Outcomes Research in Therapeutics (Edmonton), Early Undifferentiated Polyarthritis (Sherbrooke) and RHUMADATA® (Montreal) registries. We restricted analyses to RA patients with at least one follow-up visit after treatment initiation and with enough data to calculate remission. Remission was defined as Disease Activity Score 28-CRP or -ESR ≤ 2.6, Simplified Disease Activity Index ≤ 3.3, or Clinical Disease Activity Index ≤ 2.8. We used Cox regression to compare ETA-B vs ETA-O regarding time to first remission during follow-up (among those without remission at baseline) and logistic regression to assess sustained remission (remission in two consecutive visits) in the first 12 months of follow-up. Models were adjusted for sex, age, body mass index (BMI), RA duration, and smoking status at cohort entry. We also adjusted for high/moderate disease activity and the use of corticosteroids, methotrexate (MTX), or hydroxychloroquine (HCQ), all at etanercept initiation.

Results: We studied 150 RA patients initiating etanercept (65% on the biosimilar) between 2015-2022. Sex distribution was similar among ETA-B and ETA-O, but the biosimilar group has a longer disease duration and moderate/higher disease activity at baseline. Among 125 participants without remission at baseline, the median time to first remission was 8.7 months with ETA-B vs 14.5 with ETA-O. In the multivariate analysis (Table 1A), we were unable to detect a clear difference in time to achieve first remission when comparing ETA-B to ETA-O (hazard ratio, HR = 1.43, 95% CI 0.65-3.13). Obesity (BMI > 30) was negatively associated with the outcome. Sustained remission in the first 12 months of follow-up was observed in 16.3% of ETA-B initiators vs 17.3% with ETA-O. After multivariate analysis (Table 1B), we were unable to establish any clear difference between ETA-B vs ETA-O (OR 1.16, 95% CI 0.31-4.74). HCQ was positively associated with sustained remission within the first 12 months.

Conclusion: In this pooled analysis of three Canadian RA cohorts, we were unable to detect clear differences in achievement or sustained remission when comparing ETA-B and ETA-O.

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Fine Particulate Matter Components and Rheumatoid Arthritis Onset

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Objectives: Ambient fine particulate matter (PM2.5) air pollution has been associated with multiple diseases, potentially including rheumatoid arthritis (RA). It remains unclear which PM2.5 chemical components are more harmful. We assessed potential associations between PM2.5 components and RA onset, and the magnitude of individual PM2.5 components' effects.

Methods: An open cohort of 12,026,786 adults (free of RA at baseline) were assembled using Ontario administrative health data over 2007-2020. These adults were followed until RA onset, death, emigration from Ontario, or end of study. An incident RA case was identified by > 2 relevant physician billing claims at least 8 weeks apart but within 2 years; or ≥ 1 relevant hospitalization diagnosis code. Annual average concentrations of ambient PM2.5 chemical components (ie, sulfate, nitrate, ammonium, organic matter, black carbon, mineral dust, and sea salt) were estimated by combining satellite data with chemical transport modeling and refined by geographically weighted regression. Exposures from 2002 to one year before RA onset or end of study were assigned to subjects based on their residential postal codes. A quantile g-computation model for time to RA onset was developed for the mixture of PM2.5 components, adjusting for sex, age, income, rurality index, chronic obstructive pulmonary disease, COPD (as a proxy for smoking), and year of cohort entry (to account for potential calendar-year effects). The relative contribution of an individual component to the overall health effect of the exposure mixture is quantified by its index weight. We conducted sensitivity analyses across subgroups of age, sex, and rurality.

Table 1. Adjusted hazard ratio (HR) (95% confidence interval, CI) and index weights from the quantile g-computation models for time to RA onset with an increase in all exposures by one decile.

Subjects	HR (95% CI) of exposure mixture	Weights of exposure variables						
		NH_4	OM	SO_4	SS	Dust	NO_3	BC
Overall	1.516 (1.507-1.524)	0.543	0.336	0.072	0.050	-0.371	-0.349	-0.280
Urban residents	1.562 (1.553 -1.572)	0.569	0.329	0.059	0.043	-0.392	-0.370	-0.239
Rural residents	1.200 (1.183-1.217)	0.353	-0.176	0.340	0.082	0.225	-0.362	-0.462
Male	1.451 (1.437-1.465)	0.527	0.332	0.099	0.042	-0.372	-0.363	-0.265
Female	1.551 (1.541-1.562)	0.547	0.337	0.063	0.052	-0.363	-0.344	-0.293
Age<=51	1.612 (1.605-1.633)	0.550	0.341	0.067	0.042	-0.351	-0.367	-0.282
Age>51	1.531 (1.519-1.543)	0.494	0.330	0.119	0.057	-0.370	-0.338	-0.291

NH_4: ammonium; OM: organic matter; SO_4: sulfate; SS: sea salt; Dust: mineral dust; NO_3: nitrate, BC: black carbon.

Results: We identified 68,759 new RA diagnoses across 141,753,040 person-years (incidence 1 in 2000 person-years). In our primary analysis with overall subjects, the adjusted hazard ratio for RA onset was 1.516 (95% confidence interval 1.507-1.524) per every decile increase in all seven exposures. Ammonium contributed noticeably more to RA onset than the other PM2.5 components. Similar positive associations between the mixture of PM2.5 components and RA, and index weights were observed in sensitivity analyses (Table 1).

Conclusion: Exposure to mixed PM2.5 elements was associated with RA incidence. Improving nitrogen use efficiency and reducing ammonium emissions may be a more efficient way to curb the burden of many chronic diseases, potentially including RA, than lessening emissions of other PM2.5 precursors.

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SARS-CoV-2 Vaccine Side Effects in Systemic Lupus Erythematosus

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Objectives: SLE patients are a potentially vulnerable population in the face of the COVID pandemic, but concerns persist regarding adverse events related to SARS-CoV-2 vaccines, since the vaccine RCTs largely excluded autoimmune disease.[1,2] We evaluated self-reported effects of SARS-CoV-2 vaccines in an SLE clinic sample.

Methods: We studied SLE cohort patients who were followed with standardized annual assessments at a Canadian tertiary care center. From January 2021 to May 2022, 345 SLE patients undergoing their annual research visit reported information on SARS-CoV-2 vaccinations. We performed descriptive analysis of type of vaccine and reported side effects, including ER visits and hospitalizations.

Results: Participants were mostly female (n = 306, 88.7%) and Caucasian (n = 209, 60.6 %) and the average SLE duration was 19.7 years (SD 11.9). 298 (86.4%) had received at least one SARS-CoV-2 vaccination and 251 (72.8%) has received at least 2 doses. Specifically, 47 (13.6%) had received one dose, 153 (44.3%) had received 2 doses and 98 (28.4%) had received at least 3. Most (n = 181, 60.7%) of initial doses were Pfizer-BioNTech mRNA Comirnaty, followed by Moderna mRNA Spikevax (n = 54, 18.1%),

AstraZeneca Vaxzevria (n = 12, 4.0%) and Johnson & Johnson Janssen Jcovden (n = 1, 0.3%). The remaining (n = 50, 16.8%) were unknown. Most (159, 63.3%) of the second doses were Pfizer- BioNTech, with 49 (19.5%) being Moderna mRNA Spikevax, 2 (0.8%) being AstraZeneca Vaxzevria and the remainder (n = 41, 16.3) was unreported. Among those with at least 1 vaccination dose, 34 of 128 patients who responded to the question reported symptoms post-vaccine (26.6%). The most common symptoms were fever and injection-related arm pain; both were reported at equal frequency (n = 9, 7.0%). This was followed by fatigue and headache (n = 6, 4.6% for both). There were 3 cases of myalgia and 2 cases of arthralgia. One patient-reported hypertension after the first dose of vaccine, which required an ER visit. There were no other ER visits or hospitalizations for patient-reported adverse events. No patients reported disease flare in the post-vaccination period.

Conclusion: SARS-CoV-2 mRNA vaccine side effects were noted by about a quarter of these SLE patients, but were mild, similar to the general population. In this sample, SARS-CoV-2 vaccination was not associated with reported side effects requiring hospitalization. References [1.] Polack FP. N Engl J Med 2020;383(27):2603-15. [2.] Baden LR; COVE Study Group. N Engl J Med 2021;384(5):403-16.

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Unfavorable Outcomes Associated With Current Standard of Care in the Management of Patients With Systemic Lupus Erythematosus

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Objectives: The effectiveness of current standard of care treatment including corticosteroids (CS) in Systemic Lupus Erythematosus (SLE) is limited and has potential side effects. This study examined the use of CS and the impact of CS use on irreversible organ damage in a longitudinal SLE cohort.

Methods: A retrospective observational study was conducted using data from a large SLE cohort in Canada. Adult patients (meeting ≥ 4 ACR SLE classification criteria, or 3 criteria and biopsy), without lupus nephritis or central nervous system lupus at entry into the cohort were included in the study. Patients were followed from index time of entry into cohort to last available clinic visit, with a minimum of 24 months of follow-up. Demographic and clinical characteristics including disease activity (SLEDAI-2K), treatment data and organ damage (SLICC/ACR Damage Index (SDI)) as the primary outcome stratified by CS use was assessed.

Table 1 CS overall and by SDI

	Overall (N=1,255)	SDI at last visit (N=1,255) 0 (n=556)	>0 (n=699)
Average CS dose over follow-up, n (%)			
0 mg/day	235 (19%)	150 (27%)	85 (12%)
>0 to <7.5 mg/day	606 (48%)	263 (47%)	343 (49%)
7.5 to <10 mg/day	145 (12%)	53 (10%)	92 (13%)
≥10 mg/day	269 (21%)	90 (16%)	179 (26%)
Among patients with CS exposure			
Mean (SD)	7.2 (5.9)	6.7 (5.9)	7.6 (5.8)
Median (IQR)	6.0 (2.7, 10.3)	5.4 (2.2, 9.3)	6.4 (3.0, 10.9)
Cumulative CS dose, at the most recent clinic visit, n (%)			
No CS ever	235 (19%)	150 (27%)	85 (12%)
≤3.65 g	128 (10%)	78 (14%)	50 (7%)
3.65 to ≤18.25 g	437 (35%)	216 (39%)	221 (32%)
>18.25 g	455 (36%)	112 (20%)	343 (49%)
Among patients with CS exposure			
Mean (SD)	25.0 (27.5)	15.3 (16.3)	31.4 (31.3)
Median (IQR)	15.6 (7.3, 31.0)	10.0 (4.9, 20.1)	21.2 (10.3, 39.8)
Cumulative years of exposure to CS			
Mean (SD)	10.3 (8.6)	7.0 (6.3)	12.5 (9.3)
Median (IQR)	7.6 (3.9, 13.5)	5.0 (3.1, 8.7)	9.9 (5.2, 17.2)

Footnotes:

Abbreviations: CS: corticosteroids; IQR: interquartile range; SD: standard deviation; SDI: SLICC/ACR Damage Index.

Results: A total of 1255 patients were included (mean (standard deviation [SD]) follow-up duration of 10.5 (8.6) years, 1111 (89%) female, and 815 (65%) White). Mean (SD) age at study entry was 35.4 (13.7) years. At index, there were 637 (51%) patients with moderate-to-severe disease activity (SLEDAI-2K ≥ 6). 182 (15%) patients had organ damage at index. Approximately 50% of the cohort were on antimalarials, CS, and immunosuppressants at any point during follow-up. Of those with moderate-to-severe disease activity at their last visit in the cohort, 57% were taking CS ≥ 10 mg/day during their last year in the cohort. Biologic (belimumab and rituximab) use was < 3% at any point during the follow-up. Almost all patients (n = 1011, 99%) had long-term (> 6 months) CS exposure. Organ damage (SDI > 0) was higher in patients with higher average CS dose and greater years of CS exposure (Table 1). The proportion of patients with any damage increased with average daily CS dose across multiple organ systems.

Conclusion: This study in a large cohort of SLE patients shows that despite current standard of care, many SLE patients are still receiving high CS doses, especially with moderate-to-severe disease. High CS use was associated with irreversible organ damage. Low use of biologics was largely driven by the lack of options and lack of public access to belimumab in Canada. These findings highlight the unmet need in the management of SLE patients, particularly in those with moderate-to-high disease severity and the need for CS-sparing treatment options and better access.

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The Effect of Sex on Patients With Pre-Existing Rheumatoid Arthritis and Immune Checkpoint Inhibitor-Induced Inflammatory Arthritis: Data From the Canadian Research Group of Rheumatology in Immuno-Oncology (CanRIO) Prospective Cohort

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Objectives: Immune checkpoint inhibitors (ICI) are the new pillar of cancer treatment. ICI upregulate the immune system. This can result in off-target immune-related adverse events (irAEs). One of the most disabling irAE is immune-related inflammatory arthritis (ir-IA) resembling rheumatoid arthritis (RA). We aimed to explore sex-related differences in patients with pre-existing RA exposed to ICI and patients with ir-IA with a RA-like presentation.

Methods: Adults with rheumatic irAEs from ICI (CTLA-4, PD-1 or PD-L1 inhibitors) or those with pre-existing rheumatic autoimmune disease exposed to ICI are prospectively followed at 9 sites in Canada. Clinical characteristics, severity of irAEs according to Common Terminology Criteria for Adverse Events (CTCAE) and management are recorded. Data at cohort entry on 126 patients recruited between January 2020 and May 2022 were available for analysis (Table 1).

Results: Eleven patients had pre-existing RA, of which 6 (55%) were

Table 1			Male	Female
Characteristics of entire cohort	Sex		n=67(%)	n=59(%)
	Age, years (mean, SD)		66.20(11.26)	65.45(9.68)
	Cancer type	Melanoma	21(31)	17(29)
		NSCLC	9(13)	20(34)
		Renal cell carcinoma	19(28)	6(10)
		Non-melanoma skin	7(10)	1(2)
		Ovary	0(0)	2(3)
		Other	13(19)	15(25)
	irAE type	Rh-irAE	48(72)	42(71)
		Skin	10(15)	8(14)
		Thyroid	11(16)	4(7)
		Colitis	10(31)	3(5)
		Liver	2(3)	0(0)
		Lung	2(3)	3(5)
		Heart	1(1)	1(2)
		Kidney	0(0)	1(2)
	Current cancer response	Complete response	5(7)	9(15)
		Partial remission	17(25)	17(29)
		Stable	9(13)	11(19)
		Progressive disease	14(21)	5(9)
		Patient has not been re-staged	13(19)	11(19)
	ICI stopped		18(27)	11(19)
Pre-existing RA	Sex		n=5 (%)	n=6 (%)
	RF or CCP positive		2 (40)	4 (67)
	RA flare		2 (40)	3 (50)
	CTCAE grade of flare	Grade 1	1 (20)	0
		Grade 2	1 (20)	1 (17)
		Grade 3	0	2 (33)
		Grade 4 or 5	0	0
	Treatment of flare	NSAIDs	0	0
		Prednisone; mean maximum daily dose in mg +/- SD	2 (40); 35.7 +/-17.7	1 (17); 15
		csDMARDs	1 (20)	3 (50)
		bDMARDs	0	0
	ICI stopped		0	1 (17)
ir-IA with a RA-like presentation	Sex		n=12 (%)	n=8 (%)
	RF or CCP positive		1 (8)	2 (25)
	CTCAE grade of flare	Grade 1	3 (25)	3 (38)
		Grade 2	5 (42)	3 (38)
		Grade 3	4 (33)	1 (13)
		Grade 4 or 5	0	0
	Treatment of irAE	NSAIDs	1 (8)	4 (50)
		Prednisone; mean maximum daily dose in mg +/- SD	8 (67); 31.25 +/- 22.5	4 (50); 25 +/- 7
		csDMARDs	2 (17)	2 (25)
		bDMARDs	0	0
	ICI stopped		6 (50)	3 (37.5)

RA, rheumatoid arthritis; RF, rheumatoid factor; CCP, anti-cyclic citrullinated factor; CTCAE, Common Terminology Criteria for Adverse Events; NSAIDs, non-steroidal anti-inflammatory drugs; irAE, immune-related adverse event; Rh-irAE, rheumatic immune-related adverse event; ir-IA, immune-related inflammatory arthritis; csDMARDS, conventional synthetic disease-modifying antirheumatic drugs; bDMARDS, biologic disease-modifying antirheumatic drugs; ICI, immune checkpoint inhibitors; NSCLC, non-small cell lung carcinoma; SD, standard deviation.

women and 5 (45%) were men. Four (67%) women and 2 (40%) men were rheumatoid factor (RF) and/or anti-cyclic citrullinated (CCP) positive. Three (50%) women and 2 (40%) men had RA flares, of which 2 women and no men had grade ≥ 3 CTCAE flares. Both men and 1/3 women with flares were treated with prednisone, with mean maximum dose higher in men (36 mg/d) than women (15 mg/d). All 3 women and 1/2 men who flared were treated with DMARDs. Twenty patients developed ir-IA with a RA-like presentation, of which 12 (60%) were men and 8 (40%) were women. Two (25%) women and 1 (8%) man were RF and/or anti-CCP positive. Four (33%) men and 1 (13%) woman had ≥ 3 CTCAE arthritis. Eight (67%) men and 4 (50%) women were treated with prednisone, with mean maximum dose higher in men (31 mg/d) than women (25 mg/d). Two (25%) women and 2 (17%) men were treated with DMARDs. ICI were discontinued in 6 (50%) men and 3 (38%) women.

Conclusion: Our results suggest sex-related differences in irAE: 1. Unlike RA, the distribution of ir-IA with RA-like presentation does not preferentially affect women, 2. In both pre-existing RA and ir-IA, more women than men were RF and/or anti-CCP positive, 3. Severe flares were more common in women than men with pre-existing RA, while severe ir-IA was more common in men, and 4. Discontinuation of ICI was more common in men than women with ir-IA. Careful clinical phenotyping may provide clues to sex differences in irAE. Larger studies are needed to confirm these findings.

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A Wolf in Sheep's Skin: Sarcoidosis Myopathy Masquerading as Idiopathic Inflammatory Myositis

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Background: Here we present a case illustrating the recognition and management of musculoskeletal complications of sarcoidosis.

Case: The patient is a 65-year-old male who presented with progressive proximal muscle weakness over 2 to 3 months as well as transient myalgias. His past medical history included coronary artery disease with a myocardial infarction 2 years prior to presentation and stable pulmonary nodules of unclear etiology for which he was followed by respirology. His medications included a beta-blocker and aspirin. Prior to symptom onset, he had been on a statin which was subsequently stopped. After being referred to rheumatology for assessment of possible myositis, he underwent an exhaustive workup. Blood work showed elevated CK of 700 U/L, elevated ALT and AST while ANA, myositis antibody panel, and anti-HMG CoA reductase antibody were negative. MRI thighs showed extensive bilateral myositis and subsequent muscle biopsy demonstrated granulomatous myositis. EMG revealed myopathic changes and CT chest showed paraspinal lesions, repeated biopsies from which were consistent with necrotic tissue and insufficient for further analysis. ACE level and calcium were normal; 25(OH)-Vitamin D was low at 58 nmol/L. His peak CK was 1915 U/L. After extensive multidisciplinary discussion of the case including review of imaging with radiology, the case was deemed to be consistent with sarcoidosis with a nodular and myopathic pattern of involvement. He was initiated on high dose steroids for sarcoid myopathy followed by methotrexate to facilitate tapering of steroids. However, despite a maximal dose of methotrexate, there was an increase in his CK levels with steroid tapering. He was then switched from methotrexate to azathioprine with minimal effect. Subsequently, he was started on anti-TNF therapy in combination with azathioprine, which resulted in normalization of his CK level and allowed for tapering of steroids. There was only a minor improvement in muscle strength, likely due to a component of atrophy noted on his imaging and chronic steroid use.

Conclusion: Sarcoidosis is often considered a great mimicker of various rheumatologic diseases and presents a diagnostic challenge. This case demonstrates an uncommon cause of myositis which should be considered in the differential diagnosis of idiopathic inflammatory myopathies.

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Organizational Interventions to Prevent and Reduce Burnout Among Physicians: A Systematic Review of Systematic Reviews

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Objectives: Physician burnout is a significant problem in modern medicine. It affects nearly half of medical students, residents, and practicing physicians. The consequences of burnout are not limited to the personal well-being of physicians; It also affects the quality of patient care and the

Table 1

Advocacy opportunities
Change clinicians' workflow including reducing time pressure by increasing visit time by five minutes
Off-loading nonessential tasks to non-physician staff; such as utilizing Medical Assistants to enter data in EHR, having clerks instead of clinicians track forms and sending faxes
Presenting office and work-life (OWL) data as a platform to discuss issues within the department
Efficient office design; Standardization of medical equipment, supplies, and health education materials in patient exam rooms
Organized activities to improve communication skills and changing/flexible work schedules.
Opportunities to support physicians directly
Organized group discussion incorporating elements of mindfulness, reflection, personal challenges, shared experience, or difficult patient care management.
Employee working groups to improve communication and cooperation.
Improving occupational safety and wellness with involving employees in decision making and improving communication with management staff.
Regular group meeting to elicit physician concerns
Specific physician interests valued through work options and case-mix adjustment
Clinical site meetings to emphasize clinical over administrative issues
Potential Opportunities
Art-therapy-based supervision group
Clinical supervision with clinical psychologist to assist staff with emotional demand of their work
Counselling session for physicians with a psychiatrist or a specialist in occupational medicine
Exercise programs with team-based incentives (e.g. roviding free access to the workplace exercise facility)
Team building, communication skils, self-esteem, and stress management sessions
• A facilitated, group-based educational discussion on mindfulness • Mindfulness-based stress reduction courses offered by continuing professional development (CPD) programme
Introduction of CCR (comprehensive care rounds) for complicated cases that are concerning for possible uncertainty of diagnosis or management
Introduction of a new general medical service contract, based on pay-for-performance system with the goal to improve both the working lives of doctors and quality of care.
Developing an innovative and simple, secure electronic health record (EHR) base text paging system to communicate

overall efficiency of the healthcare system. Considering that organizational factors are one of the primary drivers of physician burnout, addressing the problem of burnout should be a shared responsibility of individual physicians and the organizations in which they work. The objective of this study is to review systematic reviews of current organizational-directed interventions that improve burnout and promote physician engagement.

Methods: A systematic literature review was conducted using search terms to identify published systematic reviews addressing physician burnout from the Cochrane Register of Controlled Trials, MEDLINE, Embase, and PsychINFO, published between January 1, 2011, to December 31, 2021. Two independent reviewers assessed the studies for eligibility. Literature reporting organizational-level interventions that showed improvement in physician burnout as their primary outcome were included. Non-English literature and research on medical trainees and other health care providers were excluded. We followed the Cochrane group's guide on conducting an overview of reviews. Interventions were evaluated for their applicability to the rheumatology community at an organizational level.

Results: The search strategy identified 2389 citations, of which 17 systematic reviews fully met the inclusion criteria. These 17 systematic reviews included 87 eligible primary studies, of which 37 reported organizational-directed or organizational/physician-directed interventions. The types of organizational-level interventions studied included workflow and time management, off-loading non-medical tasks, leadership development, communication, team building, and stress management. These interventions were subcategorized into "Advocacy opportunities," "Opportunities to support physicians directly," and "Potential opportunities" (opportunities that may have utility in different specialties with adaptation and organizational support for implementation) (Table 1).

Conclusion: Evidence from this review of systematic reviews shows that organizational-directed strategies could help reduce physician burnout. Most interventions that were effective involved targeting workflow and flexible schedules, as well as individual-level strategies that organizations could implement to better support staff, including group mindfulness programs. This work is currently being evaluated by the Canadian Rheumatology Association (CRA) human resources committee to develop recommendations to support the current rheumatology workforce.

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Comparison of Patients Who Have Received 2 COVID-19 Vaccinations and Patients Who Have Not Received Any COVID-19 Vaccinations in a Community Rheumatology Practice (October 2021-August 2022)

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Objectives: The objective of this study was to investigate the differences in characteristics between Rheumatology patients that received two COVID-19 vaccines and patients that were unvaccinated to better understand individual treatment needs.

Methods: A single-center chart abstraction study was performed. Data were collected on vaccination status, patient age, sex, ethnicity, diagnosis, advanced therapy usage, number of visits to a Rheumatologist in the previous year, disease activity status, number of COVID-19 PCR tests taken since March 15, 2020, and number of comorbidities. Characteristics of 105 fully vaccinated patients and 47 unvaccinated patients were compared using chi-square for categorical variables and independent *t*-tests for continuous variables.

Results: Among 152 patients, 70% were female and 49% were Caucasian, 27% were South Asian, 16% were Black and 5% were Asian. Patients who remained unvaccinated were more likely to be younger ($P = 0.03$) and be of a Black racial/ethnic background. No significant differences were found in other demographic characteristics, number of COVID-19 PCR tests, the use of advanced therapy, or number of comorbidities between vaccinated and unvaccinated patients.

Conclusion: Vaccination status may be associated with ethnicity and age, though no other significant demographic differences were found between vaccinated and unvaccinated patients. Better understanding and efforts to reduce racial/ethnic disparities in COVID-19 vaccinations is warranted.

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Incidental Findings on FDG-PET/CT in Large-Vessel Vasculitis

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Objectives: This study aims to determine the number and type of incidental findings detected on positron emission tomography (PET)/CT in a cohort of patients with large-vessel vasculitis (LVV).

Methods: Reports from PET/CT studies along with the medical charts of a cohort of patients with LVV from a Rheumatology clinic in Edmonton, Alberta, Canada were retrospectively reviewed. Incidental findings from PET/CT, along with follow-up studies and their diagnosis were documented. The data was analyzed with descriptive statistics.

Results: The disease activity of 40 patients, with an average age of 65.8 years, was investigated using PET/CT. A statistically significant increase in incidental findings with age was observed. A total of 61 incidental findings were found in 26 (65%) patients (Table 1). Of these findings, 25 were in the abdomen and pelvis. The most common incidental finding was lymphadenopathy. Follow up investigations of incidental findings lead to 5 clinically significant findings including metastatic adenocarcinoma, mycobacterium avium infection, papillary thyroid carcinoma, pheochromocytoma, and stroke.

Conclusion: PET/CT is a reliable tool for determining disease activity in LVV patients and the implications of incidental findings need to be discussed with patients by the ordering care provider. This study demonstrates that incidental findings on PET/CT scan are common and increase

Table 1. Summary of incidental findings by site

Site of incidental findings	Total findings	Incidental findings
Vascular, bursae and joints	7	Atherosclerosis (5) Bursitis (1) Joint arthropathy (1) Vertebral artery dissection (1)
Musculoskeletal	4	Degenerative changes (2) Congenital vertebral fusion (1) Spinal canal stenosis (1)
Head and neck	13	Thyroid nodule (3) Meningioma (2) Posterior tongue lesion (2) Brain lesion (1) Enlarged palatine tonsil (1) Increased palatine tonsil uptake (1) Lymphadenopathy (1) Parotid gland lesion (1) Sinus cyst/polyp (1)
Chest	12	Lymphadenopathy (4) Lung nodule (3) Atelectasis (1) Bronchiectasis (1) Esophageal diverticulum (1) Pulmonary fibrosis (1) Pulmonary opacities (1)
Abdomen and pelvis	25	Diverticulosis (5) Cholelithiasis (4) Hepatic cyst (3) Lymphadenopathy (2) Renal cyst (2) Adnexal cyst (1) Atrophic kidneys (1) Colonic nodule (1) Decreased liver activity (1) Increased cecal uptake (1) Pancreatic cyst (1) Portacaval mass (1) Stomach nodule (1) Suprarenal mass (1)

with age in patients with LVV. A significant number of patients required further investigation for incidental findings.

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Improvement in Key PsA Core Domains With Guselkumab Treatment in an Enriched Population of ACR20 Non-responders at Week 24: Post Hoc Analysis of Two Phase 3 Studies

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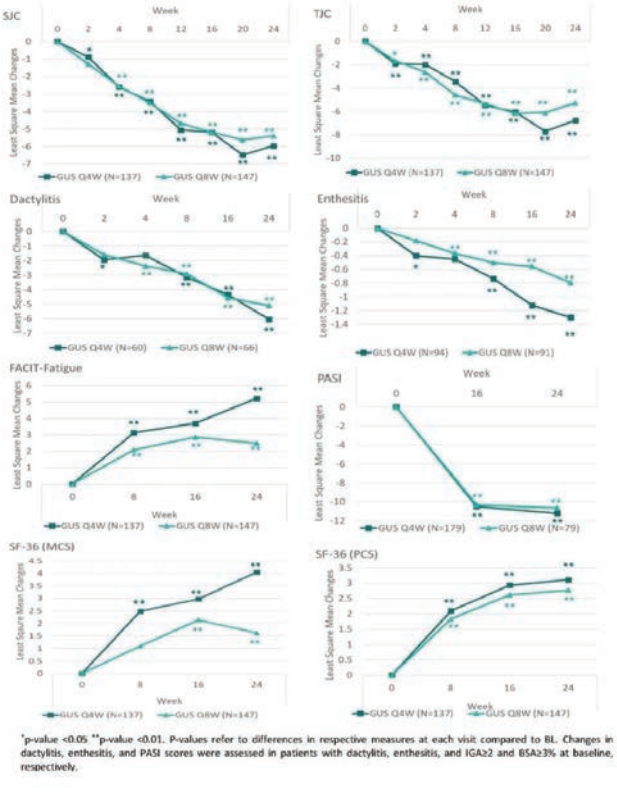
Objectives: A portion of PsA patients (pts) does not achieve improvements in signs and symptoms according to ACR response criteria. Using data from DISCOVER-1 and DISCOVER-2 (D1/D2) studies in pts with active PsA, the objective was to describe the benefit of guselkumab (GUS) across key PsA domains, including those not comprising the core ACR measures, in pts not meeting ACR response criteria.

Methods: Pts enrolled in D1 and D2 were adults with active PsA despite standard therapies. Pts were randomized 1:1:1 to GUS 100 mg every 4 weeks (Q4W); GUS 100 mg at W0, W4, then Q8W; or PBO; PBO pts crossed over to GUS 100 mg Q4W at W24. In this post hoc analysis, patients not meeting ≥ 20% improvement in ACR response criteria (ACR20) at W24 were included. Changes from baseline (BL) over 24 W in continuous outcomes of interest (SJC; TJC; enthesitis/dactylitis scores; psoriasis area and severity index [PASI] score; Functional Assessment of Chronic Illness Therapy [FACIT]-fatigue score; and SF-36 physical [PCS] & mental [MCS] component summary scores) were assessed with repeated measures mixed models adjusting for treatment group, BL non-biologic DMARD use, and prior TNFi use. Descriptive statistics were produced for categorical outcomes at W24 using non-responder imputation for missing data.

Results: Of the 1120 pooled D1/D2 pts, 538 did not achieve an ACR20 response at W24, including 137 (36.7%) GUS Q4W, 147 (39.2%) GUS Q8W, and 254 (68.3%) PBO pts. A greater proportion of GUS- than PBO-treated pts achieved W24 categorical outcomes, including those relating to skin, tender joints, and dactylitis, with similar findings for GUS Q4W and Q8W. For continuous endpoints, the benefit of GUS was seen as early as W2 for SJC (W4 for Q8W), TJC, dactylitis (W4 for Q8W), and enthesitis (W4 for Q8W); W8 for FACIT-fatigue, SF-36 PCS, and SF-36 MCS (W16 for Q8W); and W16 for PASI; most endpoints continued to improve through W24 (Figure 1). Across both GUS treatment groups, 43.5-48.9% of W24 ACR20 non-responders achieved an ACR20 response by W52.

Conclusion: In W24 ACR20 non-responders, GUS-treated pts experienced greater benefits than pts receiving PBO in improving joint disease and other important PsA domains outside the ACR response criteria, which translated to significant improvements in health-related quality of life. These benefits occurred as early as W2 of GUS treatment and showed continued improvement over 24 W, such that considerable proportions of W24 ACR non-responders achieved an ACR20 response by W52.

Figure 1. Improvement vs. BL Over 24 Weeks in Key PsA Core Domains Among ACR20 Non-Responders at W24 Treated with GUS



*p-value <0.05 **p-value <0.01. P-values refer to differences in respective measures at each visit compared to BL. Changes in dactylitis, enthesitis, and PASI scores were assessed in patients with dactylitis, enthesitis, and IGA≥2 and BSA≥3% at baseline, respectively.

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Usability Testing of JIActiv, a Social Media-Based Program Promoting Engagement in Physical Activity Among Young People Living With Juvenile Idiopathic Arthritis

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Objectives: This study evaluated the usability (user performance and satisfaction) of a social media-based program promoting physical activity among young people with juvenile idiopathic arthritis (JIA).

Methods: We conducted two cycles of usability testing of JIActiv, an educational and interactive Instagram-based program promoting physical activity among French and English-speaking young people with JIA. Both cycles (Total n = 28) involved a qualitative study with semi-structured interviews. Here, we report the results of the second cycle, which led to the second and final prototype after minor modifications. A purposive sample of 13 adolescents and young adults with JIA was recruited from patient organizations, as well as a rehabilitation and a hospital center to participate in this cycle. There were 6 adolescents (mean age = 16, SD = 0.84) and 7 young adults (mean age = 19, SD = 0.58). The interview questions were grouped into 7 main categories including safety, design aesthetics, functionalities, content of the page, language display, organization of the program and suggestions for improvement to the JIActiv program. The interviews were completed individually online over Zoom. Audiotaped recordings were transcribed verbatim, sorted, organized, and coded using MAXQDA11 software.

Results: Participants used a computer, a smartphone or a tablet to access and navigate the JIActiv program. Overall, the participants did not report any significant concerns about privacy and safety. Most of them also found the program easy to navigate. All participants were satisfied with the program's visual appeal. The interactive features supporting group-based

activities were highly appreciated as it offered opportunities to communicate and share information and experiences with peers. Most participants reported that the featured information was relevant and of good quality. The bilingual nature of the posts was not seen as a barrier to the use of the program. Generally, the organization of the program (overall length of the program, frequency of posts and weekly time requirements) was seen as adequate by the majority of participants. Participants suggested some minor modifications to the program. Based on these, modifications were implemented including edits to the informational videos to facilitate navigation.
Conclusion: Findings report on the usability testing of JIActiv, an interactive and educational Instagram-based program aimed at promoting physical activity among French and English-speaking young people living with JIA. This testing has allowed us to optimize end users' (young people with JIA) ability to access, to navigate, to understand and to implement the informational content and practical strategies featured through this program in a culturally competent, efficient and satisfying manner. Supported by a CIORA grant.

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HyperCKemia From ICI-Associated Adrenal Insufficiency

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Background: Here we report a case of ICI-associated adrenal insufficiency related myopathy that was mistaken for ICI-associated inflammatory myositis.
Case: Immune checkpoint inhibitors (ICIs) promote an anti-tumor immune response via T-cell activation.[1] ICIs have been reported to cause numerous immune-related adverse events (irAEs), including inflammatory myositis and adrenal insufficiency which are rare, but potentially life-threatening.[1,2] We report a case of ICI-associated adrenal insufficiency related myopathy that was mistaken for ICI-associated inflammatory myositis. After obtaining patient consent, retrospective chart review was performed and pertinent findings are reported. We report a 78-year-old male with a history of sigmoid adenocarcinoma, treated with sigmoid resection in 2013, dyslipidemia and hypertension. He was diagnosed with acral lentiginous melanoma in August 2017 and underwent surgical resection. His cancer recurred in April 2021 and was subsequently started on ipilimumab and nivolumab July 2021. After two cycles of immunotherapy, he was found to have an asymptomatic rise in his CK (1727 U/L) with a normal CRP 0.4 mg/L. ECG and troponin-I were normal. He had a slight transaminitis (ALT 97, AST 145, ALP 54, bilirubin 10). TSH was 0.02, with normal free T4 (9.6 pmol/L), low free T3 (2.6 pmol/L). His oncologist then started prednisone 0.5mg/kg/day for possible inflammatory myositis and ICI therapy was held. He was referred to rheumatology and when assessed 6 days later, at which time his CK had normalized. Strength was 5/5 centrally and in all extremities in proximal and distal muscle groups. No rashes consistent with dermatomyositis were present. His pravastatin was discontinued by rheumatology. An MRI of his hip girdles performed 10 days after starting prednisone showed no evidence of myositis. Acetylcholine receptor antibody test was negative (< 0.20 nmol/L) and myositis antibody panel was negative. Prednisone was then tapered off. Five days after discontinuing prednisone, he presented to the Emergency Department with significant generalized weakness, fatigue and confusion and was found to be relatively hypotensive compared to his baseline (109/69 mmHg). AM cortisol was 27 nmol/L. Endocrinology was consulted and ACTH stimulation test confirmed a diagnosis of central adrenal insufficiency likely related to ICI therapy. He was treated with replacement dose hydrocortisone and his symptoms resolved. His CK remained normal off of prednisone. His TSH also normalized with prednisone treatment and remained normal on hydrocortisone.
Conclusion: Elevated CK has been reported with central adrenal insufficiency, although it is not a common presentation.[3] This case illustrates the importance of considering a wide differential when assessing hyperCKemia in the setting of ICI use. References: [1.] Jamal S. J Rheumatol 2020;47(2):166-175. [2.] Byun D. Nat Rev Endocrinol 2017;13(4):195-207. [3.] Lau S. Intern Med 2012;51(17):2371-2374.

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A Rare Presentation of Central Nervous System Vasculitis Caused by Herpes Simplex Virus Type 2

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Background: Primary angiitis of the central nervous system (PACNS) has a wide differential diagnosis, including infectious etiologies which can worsen with systemic immunosuppression. This case illustrates the importance of considering rare infectious etiologies of CNS vasculitis prior to initiating treatment with immunosuppressive agents.
Case: A 59-year-old female was admitted with transient right-sided weakness and paresthesia. MRI angiography showed multifocal acute infarcts within the left MCA territory with abnormal concentric wall thickening and enhancement of the left cervical ICA extending to the M1/M2 segment with a severely stenotic mid left M1, suggesting underlying vasculitis. The rheumatology service was consulted, and a full review revealed a history of recurrent miscarriages and IgG deficiency, but no other features of connective tissue disease or systemic vasculitis. Her autoimmune serologies were negative except for a mildly elevated rheumatoid factor and a low titer anticardiolipin IgG antibody. She did not have traditional stroke risk factors. Echocardiogram, Holter monitor, and a CT angiogram of the chest, abdomen, and pelvis were normal. CSF analysis showed a leukocytosis, elevated protein, oligoclonal bands, and an elevated IGG index. Infectious workup revealed Herpes Simplex Virus Type 2 (HSV-2) in the CSF by PCR. The patient was treated with intravenous acyclovir for 14 days, followed by a course of oral valacyclovir with taper to a prophylactic dose. She also received traditional secondary stroke prevention therapies with low dose aspirin and a statin. A repeat MRA showed mild interval progression but a repeat CSF analysis showed resolution of the leukocytosis and elevated protein. Her neurologic examination at discharge was normal.
Conclusion: This case of a large-vessel vasculitis of the CNS caused by HSV-2 provides an example of the importance of considering infectious causes of vasculitis, particularly in patients presenting with stroke in the absence of traditional risk factors. HSV-2 is a well-documented cause of encephalitis, but it can also cause ischemic strokes due to large-vessel vasculitis, and should be investigated for in the workup of PACNS.

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New-onset Immune-Mediated Disease Following SARS-CoV-2 Vaccination: A Case Series

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Objectives: The COVID-19 vaccine campaign is the largest and fastest in history, and the first use of mRNA vaccines outside a research setting. Limited evidence exists regarding the risk of developing immune-mediated disease (IMD) other than myocarditis and vaccine-induced thrombotic thrombocytopenia following SARS-CoV-2 vaccination. The objective of this study is to report the baseline characteristics and outcomes of adult patients with new-onset of IMD following SARS-CoV-2 vaccination referred to rheumatology practices in British Columbia.
Methods: Adult patients who developed new-onset IMD within 30 days of receiving a dose of a Health Canada approved SARS-CoV-2 vaccine between December 2020 and March 2022 were identified by survey of the British Columbia Society of Rheumatology. Relevant data was extracted by retrospective chart review.
Results: Thirty-seven patients with IMD following SARS-CoV-2 vaccination were identified. Seventy percent of cases were female and the mean

Table 1. Treatment and response at last follow-up

Therapy	Cases (n=37)
Expectant management	2 (5.4%)
NSAID monotherapy	3 (8.1%)
Colchicine	1 (2.7%)
Glucocorticoid monotherapy	7 (18.9%)
DMARD without glucocorticoids	1 (2.7%)
DMARD and glucocorticoids	19 (51.3%)
Advanced immunosuppression	3 (8.1%)
Unknown	1 (2.7%)
Response at last follow-up	**Cases (n=37)***
Spontaneous resolution	4 (10.8%)
Drug-free remission	6 (16.2%)
Medication-induced remission	
Stable or tapering dose prednisone monotherapy	1 (2.7%)
DMARD and stable or tapering dose prednisone	8 (21.6%)
DMARD, tapered off prednisone	10 (27.0%)
Persistent disease activity	6 (16.2%)
Damage-related symptoms	2 (5.4%)
Lost to follow-up/Unknown	2 (5.4%)

*Patients with damage-related symptoms despite achieving medication-induced remission were counted twice

age was 59 years (range: 26-82). Mean time from vaccine administration to symptom onset was 7.69 days (range: 0-30, median: 3 days). New-onset IMD arose following Pfizer-BioNTech vaccination in 15/37 cases (40.5%), Moderna in 4/37 cases (10.8%), and Oxford-AstraZeneca in 6/37 (16.2%). IMD developed following the first dose in 17/37 cases (45.9%), second dose in 13/37 (35.1%), and third doses in 4/37 (10.8%). Inflammatory arthritis was the most common diagnosis (n = 18, 48.6%), of which with the majority were seronegative. Three patients had connective tissue disease (SLE, anti-synthetase syndrome, rapidly progressive interstitial lung disease and skin thickening without Raynaud's, nailfold capillary abnormalities, or ANA positivity), four had vasculitis (giant cell arteritis, large-vessel vasculitis, cryoglobulinemic vasculitis, and isolated aortitis), four had polymyalgia rheumatica, two had adult-onset Still's disease, and one had eosinophilic fasciitis. Three patients had life-threatening disease, seven had severe disease requiring hospitalization that was not life-threatening, 22 had moderate disease, and five had mild disease. Data regarding treatment and response are in Table 1. The majority (62%) had a chronic course requiring continued DMARD administration at last follow-up.

Conclusion: Individuals without pre-existing rheumatologic disease may develop IMD following SARS-CoV-2 vaccination. IMD may be chronic and require initiation of long-term immunosuppression. Given the uncontrolled nature of this study, no conclusions can be drawn as to the relative risk of developing IMD following SARS-CoV-2 vaccination relative to the risk following other vaccines or the baseline population rate.

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Evaluation of Oral Health Interventions in Patients With Rheumatoid Arthritis: A Systematic Review

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Objectives: There is a bidirectional association between periodontitis and rheumatoid arthritis (RA). In previous work, we found that oral hygiene practices of patients with RA are impacted by disease-related functional limitations and xerostomia, and that patients are seeking recommendations to optimize their oral care. We conducted a systematic literature review to determine whether professional dental treatment or any specific oral health self-care practice is more beneficial than the current standard of care for adults with RA.

Methods: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and using a comprehensive search strategy, we searched OVID/Medline, PubMed, Cochrane, OVID Embase, and Web of Science databases to identify studies evaluating oral health management in RA patients. We included studies of adults with diagnosed RA according to ACR/EULAR criteria without restrictions on study type, study duration, or language of publication. We excluded studies evaluating pediatric populations, animals, and patients on immunosuppressant therapy for cancer. Title, abstract and full text screening were performed in duplicate after a calibration exercise. Discrepancies were resolved by a third review and consensus. Study quality was evaluated using the McGill Mixed Methods Assessment Tool (MMAT). Data on standard arthritis and oral health outcomes were extracted and summarized.

Results: The search identified 13,853 articles of which 31 studies from over 20 countries were included; 20 (65%) evaluated non-surgical periodontal treatment (NSPT), 7 (23%) evaluated RA immunomodulatory therapies, and 4 (13%) evaluated oral hygiene interventions. There were also 2 systematic reviews (1 on NSPT; 1 on RA therapy). Only short-term outcomes (< 6 months) were assessed. Five of seven (71%) randomized control trials on NSPT found improvement in RA and oral health outcomes. Results varied in other study types investigating NSPT [8 non-randomized experimental studies (NRES), 2 case series, 1 case]. Five of seven (71%) studies evaluating RA immunomodulatory therapies (biologics/targeted small molecules) (4 cross-sectional, 1 NRES, 2 case series) found improvements in oral health parameters in addition to improved RA outcomes. Studies evaluating the effect of oral hygiene interventions (electric vs manual toothbrushes, oral rinses and oral gels) showed improvements in oral symptoms and periodontal parameters but limited and variable improvements in RA parameters. Studies were of low to moderate quality (median MMAT score 4.)

Conclusion: While high quality studies of longer duration are needed, these findings highlight the importance interdisciplinary management, including professional oral care, to optimize both arthritis and oral health outcomes for people with RA.

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Healthcare Use Depends on Gender and Race for Ocular Inflammatory and Infectious Diseases. Results From the Medicare Data

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Objectives: Outcome and disease progression in rheumatology patients depends on the use of health care. Health care use is impacted by patient's gender, race, education and income. Ocular inflammatory diseases are an important cause of morbidity and affect quality of life for rheumatology patients. We have used Medicare data to identify how gender and race affect health care use for ocular inflammatory and infectious diseases

Methods: We have used Medicare data available through the National Vision and Eye Health Surveillance System (VEHSS). Medicare is a national insurance program administered by government of the United States. For this study Medicare data were collected for the year 2018. VEHSS uses

Table 1: Medicare Utilization for Inflammatory and Infectious eye disease category and subgroups by race: 2018

		Inflammatory and infectious eye disease % (95% CI)	Conjunctivitis % (95% CI)	Eyelid infection and inflammation % (95% CI)	Keratitis % (95% CI)	Infectious diseases % (95% CI)	Lacrimal and orbital inflammation % (95% CI)	Endophthalmitis % (95% CI)	Other % (95% CI)
2018									
White	24,234,800	11.7 (11.7 - 11.7)	5.1 (5.1 - 5.1)	4.3 (4.3 - 4.3)	3.3 (3.3-3.3)	0.5 (0.5-0.5)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	0.5 (0.5-0.5)
Black	2,711,100	9 (9-9)	4.8 (4.8 – 4.9)	2.1 (2.1-2.1)	2.1 (2-2.1)	0.3 (0.3-0.3)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	1 (1-1)
Hispanic	1,755,400	11.8 (11.7 - 11.8)	6.8 (6.8.-6.8)	3.2 (3.2-3.2)	3.1 (3-3.1)	0.3 (0.3-0.3)	0.1 (0.1-0.1)	0.1 (0.0-0.1)	0.5 (0.5-0.5)
Asian	794,500	15.6 (15.4 - 15.6)	9 (8.9 - 9.1)	4.2 (4.1-4.2)	4.4 (4.4-4.4)	0.4 (0.4-0.4)	0.4 (0.4-0.4)	0.1 (0.0-0.1)	0.7 (0.7-0.7)
NAN*	177,100	10.2 (10.3-10.5)	6.3 (6.2-6.4)	2.1 (2.1-2.2)	2.4 (2.3-2.4)	0.3 (0.3-0.4)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	0.6 (0.6-0.7)
Other	236,100	12.9 (12.8 – 13.1)	6.7 (6.6-6.8)	4.1 (4-4.2)	3.5 (3.5-3.6)	0.4 (0.4-0.4)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	0.6 (0.6-0.7)

*North American Native.

international classification of diseases (ICD-10) codes to identify ocular disorders and organizes them into two level categorizations: category and subgroup. Each code is categorized in one subgroup and multiple subgroups are combined to form a category. The inflammatory and infectious eye disease category includes subgroups of ocular inflammatory conditions, lacrimal system and orbital inflammation, keratitis, conjunctivitis, eyelid inflammation and infection and endophthalmitis. Medicare beneficiaries are classified as either male or female. Race includes: Asian, Black (non-Hispanic), White (non-Hispanic), Hispanic (any race), American Indian and Alaska Native (AIAN), other (including multiple or missing race). Use for the inflammatory and infectious eye disease category is stratified by gender and race. Effect of stratification on use is determined by race and gender alone and combining race and gender.

Results: There were 29,909,000 million Medicare beneficiaries; 16,514,000 females and 13,395,000 males for the year 2018. Females had higher utilization (13.3%, 95% CI 13.3-13.3) as compared to males (9.4%, 95% CI 9.3-9.4). People of Asian descent had higher utilization 15.50% (95% CI 15.4-15.6) and Blacks had lower utilization (9%, 95% CI 9-9) as compared to Whites (11.7, 95% CI 11.7-11.7). Table 1 shows Medicare Utilization for Inflammatory and Infectious eye disease category and subgroups when stratified by race. When stratified by gender and race females have higher utilization than males for all the races.

Conclusion: Use of heath care for ocular inflammatory and infectious disease depends on gender and race. Future studies are required to explain these disparities in health care utilization.

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Exploring Canadian Patient Experiences of Living With Lupus Nephritis

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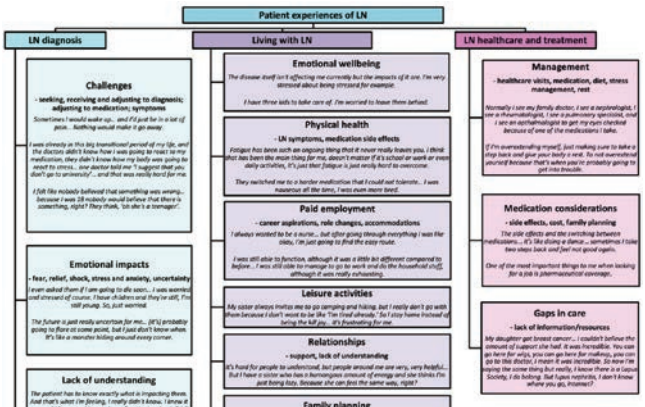
Objectives: To investigate lupus nephritis (LN) patient experiences and perspectives of (1) LN diagnosis; (2) living with LN; and (3) LN healthcare and treatment using semi-structured interviews.

Methods: Patients aged ≥ 18 years with biopsy-proven pure or mixed International Society of Nephrology/Renal Pathology Society Class III, IV, or V LN and fulfilling the American College of Rheumatology 1997 or Systemic Lupus International Collaborating Clinics 2012 Classification Criteria for systemic lupus erythematosus (SLE) were recruited from a Canadian lupus cohort to participate in virtual, semi-structured in-depth interviews. Thematic analysis of responses was performed using NVivo Qualitative Data Analysis Software.



Results: Nineteen patients were interviewed; 89.5% female, mean (SD) age 43.0 (15.7) years, mean (SD) age at SLE diagnosis 29.8 (13.2) years. Patients had LN classifications III (31.6%), IV (21.1%), V (15.8%), or mixed (31.6%). Patients reported challenges seeking, receiving, and adjusting to LN diagnosis, and all described emotional impacts of diagnosis ("The future is really uncertain for me... it's like a monster hiding around every corner"). Most patients had not heard of LN prior to diagnosis making it difficult to contextualize their illness (Figure). While most continued in paid employment, patients identified altered career aspirations, role changes, and the need for workplace accommodations. Patients also described modified leisure and social activities ("I stay home instead of being the kill joy... It's frustrating for me"). While many described supportive friends/family, lack of nuanced understanding by others was reported ("I have a sister who has a humongous amount of energy and she thinks I'm just being lazy"). Those diagnosed at/before childbearing age described LN as a factor in their family planning due to fears of reproductive side effects when changing LN medications, experiencing a flare while pregnant/when parenting, and passing on LN/other autoimmune conditions to their children (Figure). Many aspects of LN management present challenges including visiting numerous healthcare providers, taking medication, monitoring diet, managing stress, and ensuring adequate rest. While many reported successful managements with medication, others expressed concern with cost and side effects ("It's like doing a dance... sometimes I take two steps back"). Challenges associated with a lack of LN-specific information and resources were also identified (Figure).

Conclusion: Lack of understanding of LN coupled with uncertainties of living with LN create a substantial psychosocial burden as patients negotiate acceptable risk. Results emphasize the need for wider LN awareness and will inform development of LN-specific patient resources to increase understanding and support decision-making.

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Late Onset Rheumatoid Arthritis Has a Similar Remission Rate as Younger Onset Rheumatoid Arthritis: Results From the Ontario Best Practices Research Initiative

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Objectives: We compared the clinical characteristics, time to remission and treatment regimen at remission between late onset rheumatoid arthritis (LORA) and younger onset rheumatoid arthritis (YORA) patients.

Methods: The Ontario Best Practices Research Initiative (OBRI) is a clinical registry of RA patients followed in routine care. This analysis used the OBRI database from 2008 to 2020. Patients were included if they had active RA disease (≥ 1 swollen joint) and were enrolled in the study within 1 year

Table. Cox proportional hazards model predicting time to remission

Baseline characteristics	Univariate		Multivariable	
Sociodemographic	HR (95% CI)	p-value	HR (95% CI)	p-value
Female gender	0.71 (0.60-0.84)	<.0001	0.87 (0.70-1.09)	0.2256
Post-secondary education	1.26 (1.08-1.47)	0.0039	1.04 (0.87-0.70)	0.6744
Ever smoked	0.87 (0.75-1.02)	0.076	0.93 (0.77-1.12)	0.4269
RA family history	0.89 (0.74-1.07)	0.2176	0.87 (0.70-1.70)	0.1817
Disease characteristics				
Positive rheumatoid factor	1.01 (0.85-1.19)	0.9182	0.94 (0.78-1.14)	0.5381
*HAQ-DI	0.62 (0.55-0.69)	<.0001	0.71 (0.61-0.84)	<.0001
Morning stiffness (>30 mins)	0.71 (0.61-0.83)	<.0001	0.89 (0.73-1.08)	0.2366
Joint erosion	0.94 (0.77-1.14)	0.5224	0.87 (0.70-1.08)	0.1954
DAS28	0.77 (0.72-0.82)	<.0001	0.88 (0.80-0.96)	0.0048
Number of comorbidities	0.83 (0.77-0.88)	<.0001	0.88 (0.81-0.95)	0.0019
Treatment				
Biologic or JAK inhibitor (time variant)	0.86 (0.71-1.03)	0.09	1.53 (0.63-3.69)	0.3485
LORA	0.83 (0.71-0.97)	0.0194	1.10 (0.90-1.34)	0.3593

*HAQ-DI = health assessment questionnaire disability index

of diagnosis. LORA was defined as diagnosis of RA after age of 60, YORA as under age of 60. Remission was defined by Disease Activity Score 28 (DAS28) ≤ 2.6. A multivariable Cox proportional hazards model was used to estimate time to remission.

Results: The study included 354 LORA patients and 518 YORA patients. Compared to YORA patients, LORA patients were less likely to be female (66% vs 80% $P < 0.0001$), and less likely to have positive either rheumatoid factor or anti-cyclic citrulinated peptide antibody (63% vs 75% $P = 0.0003$). The mean (standard deviation) baseline DAS28 score was 5.0 (1.3) and 4.8 (1.2) in LORA and YORA patients, respectively ($P = 0.0946$). During the study follow-up, 254 (72%) LORA and 405 (78%) YORA patients reached remission. Compared to YORA patients, the hazard ratio (HR) for remission in LORA patients was 1.10 (95% confidence interval 0.90-1.34 $P = 0.35$) after adjusting for other prognostic factors (Table). For patients who reached remission, LORA patients were less likely to be on a biologic or JAK inhibitor (16% vs 27%) and more likely to be on a single conventional synthetic disease-modifying antirheumatic drugs (csDMARD) (34% vs 27%) compared to YORA patients (chi-square test for all drug groups $P = 0.0039$).

Conclusion: LORA and YORA patients had similar prognosis in terms of time to remission. At remission, LORA patients were more likely to be on a single csDMARD without a biologic or JAK inhibitor. This suggests that LORA patients likely do not require combination DMARD or biologic on initiation. Future studies should evaluate if a standardized treatment protocol tailored to LORA patients improves the safety of RA treatment and remission rate.

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