1

Physical Activity in Axial Spondyloarthritis: A Cross-Sectional Study of Awareness and Adherence to Canadian Guidelines.

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Objectives: Despite the known benefits of physical activity (PA), literature suggests patients with axial spondyloarthritis (axSpA) fail to meet recommended guidelines. This is significant since exercise, a critical component of physical activity, is considered the cornerstone of axSpA management. This study aims to determine: (i) awareness of established PA guidelines, (ii) the degree to which patients with axSpA are meeting these guidelines and (iii) to understand factors that influence adherence to regular PA.

Methods: A prospective cross-sectional study was conducted of English-speaking adults attending an urban academic clinic in Toronto, Canada; aged 18 years and older; diagnosed with axSpA (based on ASAS criteria) and registered in a longitudinal cohort. Patients completed an electronic survey that included the 'Short Questionnaire to Assess Health-enhancing Physical Activity' (SQUASH) to assess PA engagement. Patients were also asked about awareness of national PA guidelines. Clinical and sociodemographic variables of the participants were obtained from the clinic's database according to their most recent protocol visit within a year of completing the electronic survey. Descriptive statistics were used for the univariate analysis. Bivariate analyses, including Chi-squared tests and t-tests, were performed to examine factors associated with PA adherence.

Results: In total, 155 respondents participated in the study. The majority of respondents were male (89%), with a mean age of 43.9 (+/-12.8) years; the majority were classified with AS (72%); the average disease duration was 20.6 (+/- 11.6) years. Most respondents were receiving either NSAID therapy (88%) and/or biologics (65%). Less than half of the cohort (46.5%) were aware of national PA guidelines: 31 % were aware of frequency recommendations; 43.7% were aware of duration recommendations and only 13.6 % were aware of strength recommendations. Nonetheless, the majority of axSpA patients (72.9%) met or exceeded recommended PA targets. Most patients (72%) reported participating in leisure-walking as a main form of PA, this met or exceeded guidelines. Adherence to PA guidelines was associated with lower disease activity, measured by BASDAI (p=0.007); higher function as measured by BASFI (0.014) and lower body mass index (BMI) (p=0.0045).

Conclusion: This study suggests the majority of axSpA patients are meeting national PA recommendations despite not being fully aware of established guidelines. Furthermore, axSpA patients may be gaining the subsequent health benefits. Targeting low disease activity, high function, & optimal lifestyle indicators, like BMI, provides a framework for focused interventions to improve adherence to PA guidelines in axSpA patients.

2

The Association between Vedolizumab and the Development of New-Onset Features of Spondyloarthritis in Patients with Inflammatory Bowel Disease: A Pilot Study.

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Centre, London); Terry Ponich (London Health Sciences Centre, London); Jamie Gregor (London Health Sciences Centre, London); Michael Sey (London Health Sciences Centre, London); Melanie Beaton (London Health Sciences Centre, London); Keith McIntosh (London Health Sciences Centre, London); Adam Rahman (London Health Sciences Centre, London)
Objectives: Vedolizumab is a humanized IgG1 monoclonal antibody to α4β7 integrin that has been approved for treatment of inflammatory bowel disease (IBD). Previous case series have suggested that vedolizumab may induce new-onset features of spondyloarthritis (SpA), such as sacroiliitis and peripheral arthritis. However, it is unclear whether these features developed after initiation of vedolizumab, were already present and under-investigated, or were masked by prior treatment with immunosuppressive therapy including tumour necrosis factor inhibitors (TNFi). Our objective was to evaluate the association between vedolizumab and development of de novo features of SpA in TNFi-experienced and TNFi-naive IBD patients.
Methods: We performed a prospective observational study of 13 TNFi-naive and 11 TNFi-experienced IBD patients. Patients were evaluated by a rheumatologist prior to the initiation of vedolizumab and at follow up visits, 8 and 24 weeks after administration. A thorough clinical history as well as physical examination was conducted by a rheumatologist to assess for any features of SpA. Clinical outcome measures for SpA and IBD, such as the Bath Ankylosing Spondylitis Disease Activity Index and Bath Ankylosing Spondylitis Metrology Index, were collected at each visit. MRI of the sacroiliac joints was also performed at each visit using the Spondyloarthritis Research Consortium of Canada protocol. These were centrally read by a radiologist, blinded to all clinical information.
Results: Twenty-four patients were recruited. One patient had evidence of burn-out sacroiliitis on MRI at baseline while another could not tolerate MRI; both were withdrawn. Five patients were lost to follow-up for several reasons including the COVID-19 pandemic. One of these patients developed polyarthralgia after vedolizumab initiation. Sixteen of the 17 remaining patients (9 TNFi-naive, 8 TNFi-experienced) did not demonstrate new clinical or radiological signs of SpA. One TNFi-experienced patient developed a worsening hip effusion at 24 week follow-up; although, this patient had pre-existing osteoarthritis identified on baseline MRI.
Conclusion: The majority of patients treated with vedolizumab did not develop new manifestations of SpA, which does not support the hypothesis that vedolizumab induces de novo features of SpA. Larger studies are needed.

3

Real-world 12-month Retention on Secukinumab Among Axial Spondyloarthritis Patients within the Canadian Spondyloarthritis (CanSpA) Research Network

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Objectives: Axial spondyloarthritis (axSpA) is a chronic, immune-mediated, inflammatory condition consisting of two clinically defined subsets, non-radiographic axial spondyloarthritis (nr-axSpA), and ankylosing spondylitis (AS), the latter characterized by structural damage of the spine and/or sacroiliac joints. It is estimated that up to 1% of the Canadian population lives with AS. Secukinumab was approved in Canada in April 2016 for the treatment of AS and has demonstrated efficacy and safety through extensive clinical trials, some accumulating five years of continuous treatment. Real-world evidence from the European Spondyloarthritis (EuroSpA) collaboration was recently published describing use of secukinumab in 13 national European SpA registries. Nevertheless, there is limited evidence on its real-world use in Canada. The objective of this study was to use the Canadian Spondyloarthritis (CanSpA) Research Network to describe the Canadian axSpA population treated with secukinumab and assess its real-world retention.

Methods: This is an observational, registry-based cohort study of Canadian ax-SpA patients 18-65 years who attend a clinic participating in CanSpA research network and have been treated with secukinumab. The CanSpA research network is a centralized database that collects information on patient and disease characteristics, medical history, treatment, effectiveness and safety outcomes pooled from multiple Canadian databases: University Health Network (UHN), Rhumadata®, and Newfoundland SpA Co-morbidities. Patients were indexed on the date of first secukinumab prescription, and retention was assessed at 12 months for the overall population, by prior use of a biologic or targeted synthetic disease-modifying anti-rheumatic drug (b/tsDMARD), and by sex. Baseline demographics and clinical characteristics are also reported.

Results: Based on preliminary analysis, 146 patients with documentation of an axSpA diagnosis were included. The mean (SD) age was 43.3 (11.0) years and 79 (54.1%) were male. Previous experience with a b/tsDMARD at index was documented for 76.7% of the patients. At 12 months post-initiation, secukinumab retention rates were 62.9% for the overall population, 55.7% and 65.0% for b/tsDMARD-naïve and -experienced patients, and 65.8% and 59.4% for male and female patients, respectively.

Conclusion: From the preliminary results of this real-world nationwide study of 146 Canadian axSpA patients, secukinumab shows good 12-months' retention rates and represents a valuable therapeutic option for the treatment of axSpA. In contrast to previous studies, retention rates were lower and differences in retention among b/tsDMARD-naïve and -experienced patients were not notable. These differences could be due to the small number of b/tsDMARD-naïve patients in the study.

4

Ixekizumab Shows a Distinct Pattern of Pain Improvement Beyond Measurable Inflammation as Assessed by MRI or CRP or BASDAI Questions 5 & 6 in Patients with Ankylosing Spondylitis

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Objectives: To evaluate pain improvement over 16 weeks (W) with ixekizumab (IXE) in patients with ankylosing spondylitis (AS), based on longitudinal status of inflammation (assessed by serum CRP values or spinal MRI Spondyloarthritis Research Consortium of Canada (SPARCC) score). Pain improvement was measured by MRI, CRP level, and BASDAI 5/6.

Methods: The Phase III COAST-V (NCT02696785) 52W, multi-center, randomized, double-blind, placebo (PBO)-controlled study examined the efficacy of IXE in patients with active AS. Adalimumab (ADA) was used as an active reference arm for the first 16W. Patients originally assigned to PBO or ADA were re-randomized to IXE at W16. Change in spinal pain at night (SP-N) and Short Form 36 Health Survey (SF-36) Bodily Pain were measured during study visits and analyzed while controlling for inflammation status using MRI, CRP levels and mean BASDAI 5/6 (Q5: Duration, Q6: Intensity of morning stiffness). Observed data analyses are presented for each group stratified by treatment arm. Initial analysis: 'controlled inflammation' is defined as MRI SPARCC SI joint <4 and MRI SPARCC Spine <3 at W16, CRP <5mg/L at every visit W4-16, or BASDAI 5/6 improvement ≥2 points at W12 and W16. Second analysis: control is defined as CRP <5 mg/L at every week between W4-16 and MRI SPARCC SI joint <4 at W16 and MRI SPARCC Spine <3 at W16.

Results: When inflammation was controlled per MRI, patients treated with IXEQ4W (-3.9, p<0.001) and ADA (-2.8, p=0.02) experienced significant reduction in SP-N vs PBO (-1.6) at W16; further improvements were experienced in patients re-randomized to IXE by W52. When inflammation was not controlled per MRI, IXEQ4W (-3.5, p<0.01) and ADA (-3.1, p=0.02) experienced significant reduction in SP-N at W16, all IXE-treated patients had further reductions at W52. When inflammation was controlled per MRI+CRP, IXEQ4W (-3.8, p=0.2) and ADA (-3.1, p=0.4) had reduction in SP-N at W16 vs PBO (-2.4), all IXE groups had further improvements at W52. When inflammation was not controlled as measured by MRI+CRP, IXEQ4W (-3.7, p<0.001) had significant reduction in SP-N vs PBO (-1.7), whereas improvement with ADA (-2.6, p=0.06) was not significant, all IXE-treated patients had further reduction by W52. For SF-36 bodily pain, improvements were observed at W16 and W52 whether inflammation was controlled or not controlled per MRI, CRP, MRI+CRP, or BASDAI 5/6.

Conclusion: This analysis adds support to the hypothesis that IXE improves pain in patients with and without measurable inflammation.

5

Sustained Functional Remission in Axial Spondyloarthritis (axSpA): Which are the Primary Outcomes that Should be Targeted to Achieve This?

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Objectives: A treat-to-target (T2T) strategy is advocated for the management of axSpA although no consensus exists as to the appropriate target/outcome; there is agreement that the key domain is disease activity. The ASDAS is recommended however the BASDAI is more feasible. Functional impairment is associated with inflammation/structural damage and is assessed in axSpA using BASFI. Sustained (≥6 months duration) low BASFI (<3) may therefore be an appropriate target. Objectives were to determine 1) to what degree duration of low disease activity impacts function and 2) which patient and disease characteristics predict sustained low BASFI focusing on a comparison of sustained (≥6 months) low ASDAS versus BASDAI.

Methods: Multi-centre, prospective BioTRAC registry collected real-world patient reported outcomes, clinical, and laboratory data on axSpA patients treated with infliximab or golimumab (2002-2018). The impact of achieving low BASDAI (<3) and/or ASDAS-inactive disease (ID) (<1.3) at 6 and 12 months, at only 6 or 12 mos, or at neither time point, and the interaction of CRP at 6 and 12 months with BASDAI, on the BASFI score at 18 mos was analyzed by generalized linear models (GLM) adjusted for age, gender, baseline disease duration, and baseline BASFI. Generalized estimating equations (GEE) were used in univariate and multivariate analyses to test baseline patient demographic and disease characteristics, treatment, sustained low BASDAI and/or ASDAS-ID at 6 and 12 months, in predicting low BASFI (<3) between 12 and 18 months.

Results: 1620 pts enrolled had sustained low BASDAI (33.7%) and ASDAS-ID (15%). In univariate GEE of baseline variables, age and baseline BASDAI, BASFI, and ASDAS were significant predictors of sustained low BASFI. In univariate GEE of follow up variables, sustained low BASDAI and ASDAS-ID were also predictors. In multivariate GEE, sustained low BASDAI and baseline BASFI were predictors of low BASFI (Table) and sustained ASDAS-ID was a weak predictor. In GLM models, sustained low BASDAI and baseline BASFI plus age were strong predictors of BASFI score at 18 months, while sustained ASDAS-ID was a weak predictor. A significant interaction was observed between duration of low BASDAI and normal CRP (<5mg/L at 6 and 12 months) with CRP remission as an independent predictor of function among patients on sustained low BASDAI.

Conclusion: Aiming for sustained low BASDAI (<3) may be a valid and more feasible T2T treatment strategy than ASDAS-ID for routine care in axSpA. Further validation is required to achieve consensus for a T2T strategy.

6

Impact of Inflammatory Arthritis on COVID-19 Outcomes: The Impact Study

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Objectives: The IMpact of Inflammatory Arthritis on COVID-19 OuTcomes study was created to understand the impact of inflammatory arthritis (IA) and associated immunomodulatory treatments on COVID-19 outcomes. We hypothesized that IA patients would have increased risk of more severe disease and benefit from vaccination.

Methods: We prospectively used a monthly administered Redcap survey to consented rheumatoid arthritis (RA) (RAPPORT registry) and spondyloarthritis (SpA) (FORCAST registry) electronically from November 2020 to November 2021. Survey questions included COVID-19 test positivity, symptom severity associated with COVID-19, vaccination rates and vaccine-related side effects. Descriptive statistics were used for patient characteristics, COVID-19 symptoms and vaccination rates.

Results: Of 2154 candidate patients, 767 (36%) patients from our cohort answered at least the baseline survey with 178 (23%) patients answering up to 10 surveys. Participating patients were mostly females (n= 274 (37%) males), 570 diagnosed with RA, and 197 with SpA. Only 39 (5%) patients were taking prednisone, while 286 (37%) took methotrexate, 626 (82%) took biologics or small molecule inhibitors (58% being TNF inhibitors). Mean HAQ at baseline was 0.56 (SD 0.55, n=217). Overall, only 19/767 (3%) patients tested positive for COVID-19, 3 (16%) testing positive twice. Mean age of COVID-19 positive patients was 54 (SD 11.2) years (all RA patients): one patient was on a biologic, 6 (32%) were on disease modifying anti-rheumatic drugs, 7 (37%) on non-steroidal anti-inflammatory drugs and 17 (90%) reported taking steroids. Seven (9%) patients were admitted to hospital due to COVID-19 symptoms with only one patient requiring ICU admission, and another patient with VTEs. 101/767 (13%) of patients reported visiting a doctor for symptoms suggestive of COVID-19. Of 648 patients who were vaccinated, 63 (10%) were single- and 583 (90%) were double-vaccinated, the majority receiving Pfizer (80%), followed by Moderna (23%), and AstraZeneca 6%). 421 (65%) patients reported side effects from the vaccine, most common being injection site pain, fatigue, and muscle aches. 136 (21%) patients reported arthritis flare but only 16 (3%) patients saw a doctor for vaccine side effects. No worsening in arthritis pain, stiffness, or HAQ scores were reported in a subset of these patients (n=21) 1- month pre- and post-COVID-19 vaccination.

Conclusion: Despite emergence of the delta variant during the study, our study highlights the relatively lower proportion rate of COVID-19 infection and complications in patients with IA. It also underscores the increased vaccination rates in IA patients with infrequent vaccine-related adverse effects requiring medical intervention.

7

Early Switching and Smoking Associated With BDMARD Refractory Disease: A 15-year Follow Up of the Alberta Biologics Pharmacovigilance Cohort

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Objectives: We evaluated rheumatoid arthritis (RA) patients with at least one year of follow-up after their first advanced therapy (biologic/JAK inhibitor), to identify characteristics associated with later multiple failure of advanced therapies (refractory disease).

Methods: The Rheumatoid Arthritis Pharmacovigilance Program and Outcomes Research in Therapeutics (RAPPORT) registry is a prospective inception cohort of northern Alberta RA patients starting their first advanced therapy. For the current analyses, we assessed patients with at least one year of follow-up after biologic/JAK inhibitor initiation. Using the one-year post enrolment date as time-zero, multivariable Cox regression was performed to evaluate factors potentially associated with ultimate occurrence of multiple failures of advanced therapies (>3 biologic classes or JAK inhibitors). Patients stopping their biologic/JAK inhibitor and not initiating another advanced therapy were censored.

Results: Of 2338 RAPPORT patients, there were 6 deaths in the first year, and an additional 225 without one year of follow-up. Of the 2107 subjects with at least one year of follow-up after their first biologic/JAK inhibitor, at our time-zero, 7.5% were on prednisone, 57.5% on concomitant methotrexate and 81% were on TNF inhibitors, with mean DAS-28-CRP 2.8 (SD 1.2) and mean HAQ 1.5 (SD 0.7) at our time-zero. Over an average 6 (SD 4.5) years of follow-up from time-zero, 271 (12.9% of the 2107) received >3 advanced therapies. In the unadjusted and adjusted models (Table 1), risk of our outcome of interest was associated with current (time-zero) smoking, current (time-zero) prednisone, moderate or high DAS28-CRP at time-zero, and entry into the cohort from 2011 onwards. As expected, risk of our outcome was higher in subjects who switched from their first bDMARD/JAK inhibitor in the first year before our time-zero, while risk was lower in subjects on anti-TNF biologic use at time-zero.

Conclusion: In patients receiving any biologic/JAK inhibitor for at least one year, factors associated with ultimately receiving >3 biologic classes/JAK inhibitors included smoking, prednisone, high disease activity, and having already switched advanced therapies within one year of the first initiated advanced therapy. Subjects entering RAPPORT since 2011 were more likely to ultimately receive ≥3 advanced therapies, possibly representing increasing therapy options and/or more aggressive approaches. Continued effort towards smoking cessation is an important adjunctive goal in RA care.

8

Radiological Validation of a Novel MRI Reporting System for Axial Spondyloarthritis

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Objectives: Challenges in the diagnosis of axial spondyloarthritis (SpA) have resulted in increasing use of magnetic resonance imaging (MRI). Often, bone marrow edema (BME) on MRI alone without a global radiologic assessment is mistakenly used to arrive at an imaging diagnosis. Given this, our group proposed a novel categorization system for MRI reporting of the sacroiliac joints (SIJs) in a recent publication (O'Neill, 2019). This abstract aims to update previously presented data validating this novel reporting system.

Methods: In this retrospective review we identified 92 patients who had spondylitis MRI protocol ordered by one of two rheumatologists for suspected SpA from 2012 to 2018. Two rheumatologists retrospectively applied the novel classification system to the original MRI reports. The original reading radiologist also retrospectively applied the novel classification system to the original MRI reports. Two MSK radiologists, blinded to the initial imaging diagnoses, completed a separate reading of the MRI images to generate a new report based on the novel classification system. A comparative assessment of the old and new reports was performed to assess the quality of the new framework.

Results: Rheumatologists disagreed on the re-interpretation of the original MRI reports in 11/92 (12.0%) patients. Consensus rheumatologist opinion and the original radiologist disagreed on the re-interpretation of 13/64 (20.3%) patients. There was 100% rheumatologist agreement on the interpretation of the new novel categorization system report as per MSK radiologist consensus report. Of all patients, 58 (63.0%) were recategorized into new categories compared to the rheumatologist's interpretation of the original report. Six patients changed from a category of sacroiliitis to an alternate or indeterminate diagnosis and one patient changed from a category of indeterminate diagnosis to sacroiliitis.

Conclusion: We present an update on a novel categorization system for reporting in axial SpA. There was significant heterogeneity in the re-interpretation of the original reports between the rheumatologists and the original reading radiologist with complete agreement utilizing the new reporting system. This indicates that current practices of reporting MRIs for SIJs lack precision and can lead to miscommunication between physicians. There were many changes in the categorization of patients between the original and new MRI reports, suggesting this novel system may have implications on clinical practice.

9

Prevalence, Incidence and Predictors of Uveitis in Spondyloarthritis in a Canadian Cohort

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Objectives: Spondyloarthritis (SpA) encompasses Ankylosing Spondylitis (AS), Psoriatic Arthritis (PsA), Inflammatory bowel disease- associated spondyloarthritis, Reactive Arthritis, and undifferentiated spondyloarthritis. These conditions share a number of extra musculoskeletal manifestations, the most common being acute anterior uveitis. PURPOSE To determine the frequency of SpA associated uveitis, to elucidate associated clinical features of SpA in patients with uveitis, and to identify SpA features that can predict flares of uveitis.

Methods: Cohort: Patients followed in the axSpA and PsA clinics at a single centre from January 2001 to December 2020 at 6–12-month intervals, according to a standard protocol including demographic and clinical variables, treatment, and acute phase reactants. Statistical Analysis:T and chi-squared tests were performed at baseline visits on demographic and clinical factors on both the SpA and PsA populations, to compare patients with and without UV. Cox proportional-hazard models with time-dependent covariates were performed on patients with UV, with their first instance of a UV flare as the outcome event. Univariate analysis was done for each clinical and demographic factor, controlling for age, sex, and disease duration. Factors significant (<0.1) in the univariate analysis were included in a multivariate analysis, controlling for age, sex and disease duration.

Results: A total of 3306 patients were included, 1724 patients with axSpA and 1582 patients with PsA. 30.2% of the axSpA cohort having uveitis (UV), vs 7.6% in the PsA. The rate of flares per person years at risk was 12.12% in the axSpA cohort, vs 1.71% in the PsA. There were more men in the total cohort (axSpA 65% and PsA 56%). Most patients were Caucasian (axSpA 67%, 94% PsA). Among axSpA patients 1169 (68%) were HLA*B27+, and 435 had UV. Among PsA patients 201 (16%) patients were HLA*B27+, and 32 had UV. The multivariate analysis of the axSpA cohort showed that higher CRP (HR 1.009 p=0.004) increased the risk of a flare, while biologic agents decrease risk of flare (HR 0.702 p=0.040) in patients with UV. In the PsA cohort, being HLA*B27+ (HR 3.084 p=0.007) increased the risk of a UV flare, while being on a DMARD decreased the risk of a flare (HR 0.262 p=0.0088)

Conclusion: Uveitis is more common in the axSpA than in the PsA population. New onset of UV was also more commonly seen in the axSpA cohort. Factors that increase the risk of new uveitis flare were elevated CRP in the axSpA cohort and being a male or HLA-B27+ in the PsA population. Best Abstract on Spondyloarthritis Research Award.

10

Help-seeking Behaviors and Treatment Preferences For Sleep Problems Among Persons With Arthritis

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Objectives: Sleep disturbances, including difficulty initiating sleep, maintaining sleep, and/or early morning awakenings are prevalent among persons with inflammatory arthritis (IA) and have been shown to contribute to worsening of symptoms including fatigue, pain, and health related quality of life. Cognitive behavioral therapy for insomnia (CBTi) is considered first-line treatment for insomnia, but accessibility is limited. Internet delivered CBTi has the potential to overcome accessibility barriers. To guide the tailoring of an internet delivered CBTi for persons with arthritis experiencing insomnia, a needs assessment was conducted to identify help-seeking behaviors, insomnia management strategies and treatment preferences.
Methods: We conducted an on-line survey with 251 individuals with arthritis (mean age ± standard deviation: 61.5 years ± 13.1) recruited through social media ads on Instagram, Twitter and Facebook and through the arthritis patient organizations Arthritis Consumer Experts, Arthritis Research Canada's Patient Advisory Board and Patients Intéressés par la Recherche en Arthrite. Participants completed self-report questions assessing insomnia symptoms (Insomnia Severity Index – ISI), help-seeking behaviors and barriers, and treatment preferences for sleep problems.
Results: Of the total sample in the past year, 65.7% had at least once used prescription medications and 36.7% had used over the counter medication to facilitate sleep. Among participants with probable insomnia (ISI score ≥ 8, n=210), 59.3% had ever discussed their sleep problem with a health care provider and 42.1% perceived a need to talk to a health care provider about their sleep problems in the past year but decided not to seek care. Most commonly endorsed reasons for not seeking treatment were having developed ways of coping (51.8%), perceptions of insomnia as an expected response to a stressful life situation (48.8%), and having previously spoken to their doctor about difficulty with sleep, but he/she was unable to help (45.2%). Among patients with probable insomnia, 25.1% rated medication treatment as very acceptable, while 43.5% rated nonmedication treatment as very acceptable, and 90.7% reported that they would be likely or very likely to try a nonmedication approach delivered over the internet and tailored to arthritis to improve sleep.
Conclusion: Given the prevalence, chronicity and adverse consequences associated with insomnia in individuals with arthritis, this study suggests that efforts designed to increase awareness of the effectiveness of behavioral treatments are needed. Behavioral interventions such as CBTi are acceptable to individuals with arthritis and these findings will guide the evaluation of an internet delivered CBTi program tailored to persons with arthritis experiencing insomnia. Supported by a CIORA grant.

11

Baring It All: A Survey and Recommendations on Sexual and Reproductive Health Needs of Women+ With Rheumatic, Inflammatory, and Psoriatic Diseases

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Objectives: To gain a better understanding of how living with inflammatory, rheumatic and psoriatic diseases affects reproductive and sexual health-related concerns for women+ throughout the life cycle.

Methods: Four national patient organizations collaborated to release the Women's Sexual and Reproductive Health Survey on International Women's Day, 2021. People who identified as female (women+) were asked about their experiences with family planning, menopause, sexual health, parenting, pain, mental health, and paying for medications.

Results: Over 400 individuals from across Canada participated in the survey. Results were analyzed based on geography, age, and self-identification as a member of a racialized community and/or as LGBTQ2S+. Information was collected about counselling and medication safety related to pregnancy and breastfeeding, postpartum disease flares, pain, and perimenopause / menopause. As well, participants shared their experiences with accessing health benefits (including prescription drug, device and professional services), challenges with paying for medication and their out-of-pocket costs for health products and services.

Conclusion: Based on the findings of this survey, to improve outcomes for women+, the following recommendations are made: 1) Destigmatize discussions of reproductive and sexual health in women+ living with these conditions and ensure these discussions are part of routine patient care. We recommend that healthcare providers raise these topics with patients early and often. 2) Healthcare professionals should share patient education resources with women+ with these conditions with a focus on : a) How to communicate effectively with healthcare providers, romantic partners, and loved ones about reproductive and sexual health needs and concerns. b) How to navigate reproductive and sexual health at different life stages (i.e., contraception, family planning, parenting, menopause, etc.). c) The impacts of medications on sexual and reproductive health of women+ and on the health of their children. d) The role of mental health as an aspect of sexual health and living with inflammatory arthritis, rheumatic, and psoriatic conditions. 3) Rheumatologists and dermatologists should counsel patients about the impact of medications and other treatments on reproductive and sexual health early and regularly to ensure patients can make informed decisions. 4) Researchers should consider the sex and gender impacts of access to care and treatment, medication safety, mental health, parenting and aging including within racialized communities and LGBTQ2S+ communities to ensure that women+ have the best evidence to inform decision-making.

12

Real-world 12-month Retention on Secukinumab among Psoriatic Arthritis Patients within the Canadian Spondyloarthritis (CanSpA) Research Network

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Objectives: Psoriatic arthritis (PsA) is an immune-mediated disease causing joint pain, stiffness, and swelling that develops in up to 30% of patients with psoriasis, with an estimated prevalence in Canada of up to 0.45%. Treatment aims to minimize disease activity, optimize functional status, improve quality of life and prevent structural damage. Secukinumab has demonstrated efficacy and safety for PsA, with some of the trials accumulating five years of continuous treatment. Real-world (RW) evidence from the EuroSpA collaboration was recently published describing secukinumab use in 13 European SpA registries. Nevertheless, there is limited evidence on its RW use in Canada. The objective of this analysis was to use the Canadian Spondyloarthritis (CanSpA) Research Network to describe the Canadian PsA population treated with secukinumab and assess retention at 12 months.

Methods: This is an observational, registry-based cohort study of Canadian PsA patients 18-65 years old who attend a clinic participating in the CanSpA research network and have received treatment with secukinumab. The CanSpA research network is a centralized database that collects patient-level information on patient and disease characteristics, medical history, treatment and safety, and outcome pooled from multiple Canadian databases: University Health Network (UHN) in Ontario, Rhumadata® in Quebec, and Newfoundland SpA Co-morbidities. Patients were indexed on the date they first initiated secukinumab. Retention was assessed at 12 months for the overall population, as well as according to prior use of biologic and targeted synthetic disease-modifying anti-rheumatic drugs (b/tsDMARD) and sex. Baseline demographics and clinical characteristics are also reported.

Results: This preliminary analysis included 210 patients with a mean (SD) age of 49.6 (10.8) years, 50.5% of whom were male (Table 1). Previous experience with a b/tsDMARD was documented at index for 69.5% of the patients. The 12 months' retention rate was 73.2% for the overall population, 81.3% and 69.7% for the b/tsDMARD-naïve and -experienced, and 79.1% and 67.3% for the male and female patients, respectively.

Conclusion: This study is the first nationwide study to describe RW retention of secukinumab in 210 Canadian PsA patients. Similar to other registry studies in the U.S. and Europe, the preliminary results of this study showed 12 months' retention rates of secukinumab are high particularly for b/tsDMARD-naïve patients and male patients. These findings further support secukinumab as a first-line option for the treatment of PsA.

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Psoriatic Arthritis and COVID-19 — Patient Perspectives in a Large Psoriatic Arthritis Cohort

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Objectives: We aimed to estimate the frequency of COVID-19 infection among patients with psoriatic arthritis (PsA), to understand patients' perspectives regarding the pandemic and to evaluate the standard of virtual care offered during the pandemic.

Methods: An online survey was conducted between June and September 2021 using the DADOS electronic data capture platform. Eligible participants had a diagnosis of PsA (CASPAR criteria) and had consented to be contacted via email. Convenience sampling was used to draw patients from a database. 591 patients were individually emailed, of whom 193 patients consented and were provided with their unique survey login credentials. The survey was completed by 151/193 patients (78.2%). Participants were asked to answer questions by reflecting on the time period between the second week of March 2020 and their date of survey completion.

Results: Of the 151 patients who completed the survey, there were 85 (56%) men, and 66 (44%) women, with a mean age of 58 years and disease duration of 19 years. At their most recent pre-pandemic visit, 40% had active arthritis (n=148). Comorbidities included lung disease in 38%, diabetes in 18% and cardiac disease in 51% (n=148). During the pandemic, the mean patient-reported joint symptom severity was 4.12 (on a 0-10 scale, SD=2.33), skin symptoms was 3.23 (2.14), and overall symptoms was 3.73 (2.07). 111 (74%) respondents found that they would accept the impact of the PsA over the past month for the next few months. Of 78 patients who were tested for SARS-CoV2-19, 4 tested positive. All 4 were admitted to hospital, 2 to Intensive Care Unit. 150/151 patients (99.3%) received at least one vaccine dose. 59/150 (39.3%) participants believed their PsA medications increased their COVID-19 risk. Virtual consults were conducted for 129 (85%) participants (telephone=102, Ontario Telemedicine Network=25, unspecified=2). A group of 113/129 (88%) participants were happy with their virtual consultations. Most patients (83%) would happily continue with virtual consultations until the pandemic is overcome. The average satisfaction level regarding pandemic care was 7.85 (SD=2.64) on a 0-10 scale.

Conclusion: COVID-19 prevalence was low among our patients. On average, our patients were satisfied with their care during the pandemic. Most of our patients would happily continue with virtual care for the duration of the pandemic.

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ASIA: Autoantibodies, Apoptosis and Autophagy

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Objectives: Silicone Breast implant related illness, a form of autoimmune syndrome induced by adjuvants (ASIA), results in severe patient morbidity – particularly stemming from myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) and fibromyalgia (FM). Comparison of cell free mitochondrial DNA (mtDNA) integrity, mitochondrial mass, autoantibodies and cellular death in ASIA and idiopathic FM patients. Understanding these factors may improve our understanding of FM and ME/CFS and can help improve differentiating them.

Methods: Markers associated with dysregulated mitochondrial functions and/or autophagy were measured via qPCR and ELISA. Cell free mitochondrial DNA integrity was defined as the ratio of small to large fragments of 16S-RNA. Flow Cytometry with Annexin V and Propidium Iodide was used to evaluate cell death.

Results: ASIA and FM patients were indistinguishable via clinically validated surveys. The severity of fatigue, as measured by the multi-dimensional fatigue inventory (MFI) was equivalent in ASIA (16 (2.46)) and Fibromyalgia (16 (2.82)) patients. FM severity, as measured by wide spread pain (WPI) and symptom severity scale (SSS) medians were 11 (3.95) and 9 (2.08), or and 10 (4.02) and 8 (2.02) in ASIA or FM patients, respectively. Leukocytes from ASIA patients are more susceptible to death than those of healthy controls ($p=0.004$) and Fibromyalgia patients ($p=0.03$). Intriguingly, increased mitochondrial fragmentation and mitochondrial mass was observed in ASIA patients when compared to both healthy controls and Fibromyalgia patients. ASIA patients were also twice as likely to test positive for autoantibodies against beta 1 adrenergic and G-protein coupled receptors, than healthy controls.

Conclusion: Increased mitochondrial DNA fragmentation (with increased apoptotic cells) and increased Beta 1 adrenergic autoantibodies have both been linked to decreased efferocytosis and autophagy, respectively. Collectively, our data suggests that in contrast to FM patients, ASIA patients may have dysregulation of both of these pathways. Further analysis is required to understand the functional implications of our findings, which may lead to integrating novel therapeutic approaches for these patients. Funding: Dutch Kidney Foundation (17PhD01) Arthritis Society (19-0558).

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Rituximab Off-Label Maintenance Dosing in Systemic Autoimmune Rheumatic Disease: A Retrospective Review

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Objectives: Rituximab is used off-label for systemic autoimmune rheumatic diseases (SARDs) including myositis, systemic lupus erythematosus (SLE), scleroderma (SSc), and Sjogren's syndrome (SjS). However, the optimal maintenance dosing regimen has not yet been defined. Our study compared the efficacy and safety of rituximab maintenance "low dose" (500mg every 6 months) to "high dose" (1g q2weeks x2 every 6 months) in patients with SARDs.

Methods: A retrospective cohort design was used to review SARD patients approved for rituximab from October 2008 - March 2021. Data sources included the Alberta Health Services' Short Term Exceptional Drug Therapy (STEDT) database, Alberta Precision Labs database, Alberta Pharmaceutical Information Network database, and patient charts. Descriptive statistics were used to describe patient outcomes. Between the high dose and low dose groups, Cox Regression analysis was used to compare the number of patients discontinuing rituximab and 2-sided Fisher's Exact Tests were used to compare the number of flares and hypogammaglobulinemia.

Results: 62 patients (44% Myositis, 27% SLE, 16% SSc, 13% SjS) were included. Eleven received high dose, 22 low dose, 17 were switched from high to low, and 12 were atypically dosed. Over a median follow-up of 2.2 years, low dose patients had a higher incidence of flares (36% vs. 27%, p=0.71), and high dose patients appeared 76% less likely to discontinue treatment with rituximab (HR 0.24, 95% CI, 0.03-1.94), though a statistically significant difference was not shown between the high and low dose groups. In patients who continued on rituximab, patient outcome parameters (including patient scales, prednisone dose, number of other concomitant steroid-sparing agents, C-reactive protein and creatinine kinase) appeared similar in both high dose and low dose groups. For patients switched to a lower dose, 29% had an indicator of possible decreased effect, however this did not result in more discontinuations. Reported adverse reactions were low (16%) and similar between all dosing groups. However, more patients in the high dose group experienced hypogammaglobulinemia than in the low dose group (p=0.08).

Conclusion: There were fewer individuals on higher dosing rituximab that discontinued and/or had a flare, than on lower dosing, and safety appeared similar, however our study was not large enough to determine a statistically significant difference between the regimens. Larger clinical trials are needed to assess efficacy and cost-effectiveness using the low dose maintenance rituximab for patients with SARDs.

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Relationships Between Fatigue and Hemoglobin/C-Reactive Protein Levels and Associations Between Fatigue and Clinical Response in Patients With Active Psoriatic Arthritis: Results From Two Randomized Controlled Trials of Guselkumab.

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Objectives: Fatigue is a key patient (pt)-reported symptom of PsA. Post-hoc analyses from the Phase 3 DISCOVER-1 (D1) and -2 (D2) studies explored 1) correlation of fatigue with systemic inflammation (CRP) and hemoglobin (Hgb); 2) relationship between improvements in fatigue and clinical outcomes with guselkumab (GUS).

Methods: Pts with active PsA despite standard therapies in D1 (swollen joint count [SJC] ≥3, tender joint count [TJC] ≥3, CRP ≥0.3 mg/dL) and D2 (SJC ≥5, TJC ≥5, CRP ≥0.6 mg/dL) were randomized 1:1:1 to GUS 100 mg Q4W; GUS 100 mg at W0, W4, then Q8W; or placebo (PBO) with crossover to GUS 100 mg Q4W at W24. Fatigue was evaluated using the Functional Assessment of Chronic Illness Therapy Fatigue (FACIT-F) scale. FACIT-F scores, as well as their correlation with CRP and Hgb were determined in pts with anemia (Hgb <13.5 [males] or <12 [females] g/dL) and without anemia through W24. Relationships between FACIT-F score and CRP/Hgb were assessed via a mixed model for repeated measures (MMRM). Associations between FACIT-F response in GUS-treated pts (Q4W+Q8W+PBOàQ4W) and achievement of ACR 20/50/70, Health Assessment Questionnaire Disability Index (HAQ-DI), and Minimal Disease Activity (MDA) responses were evaluated at W52 for D1/D2 and at W100 for D2.

Results: All pts pooled across treatment groups (N=1120), significant correlations between FACIT-F scores and mean CRP/Hgb levels were seen at each visit . Through W24, anemic pts had numerically lower FACIT-F scores (28.7-33.3) vs non-anemic pts (30.3-36.3). Among 112 pts with anemia at BL but not at W24, mean FACIT-F scores improved from 31 (W0) to 37 (W24). MMRM results showed that CRP and Hgb levels were significant predictors of FACIT-F (each $p<0.0001$). GUS-treated pts achieving ≥4-point improvement in FACIT-F score at W52 (52-62% of 381 pts in D1 and 64-66% of 739 bio-naïve pts in D2) were more likely to also achieve ACR20/50/70, HAQ-DI, and MDA responses than FACIT-F non-responders (Figure). With continued GUS through W100, 65% of D2 pts with FACIT-F response showed an even stronger propensity than FACIT-F non-responders for achieving ACR20 (odds ratio [OR]=8.2 [5.7, 11.8]), ACR50 (OR=5.9 [4.2, 8.3), ACR70 (OR=4.4 [3.0, 6.6]), HAQ-DI (OR=7.9 [5.5, 11.2]), and MDA (OR=3.4 [2.4, 4.8]) responses vs FACIT-F non-responders.

Conclusion: In pts with active PsA, CRP and Hgb levels were key predictors of FACIT-F scores. FACIT-F responders were more likely to achieve favorable clinical outcomes through up to 2 years of GUS.

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Guselkumab Improves Anemia in Patients with Active Psoriatic Arthritis: Results From Two Phase 3 Randomized Controlled Clinical Trials

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Objectives: Anemia related to systemic inflammation can be an important feature of PsA. Hemoglobin (Hgb) levels have been shown to be inversely related to disease activity in other rheumatic diseases. This post-hoc analysis assessed the effect of guselkumab (GUS), on anemia in the pooled Phase 3 DISCOVER 1 & 2 trials.

Methods: 1120 patients with active PsA, biologic naïve (~30% of DISCOVER-1 patients received 1-2 TNFi), were treated with GUS 100 mg Q4W; GUS 100 mg at W0, W4, Q8W; or PBO with crossover to GUS 100 mg Q4W at W24. Treatment was given for 1 (DISCOVER 1) or 2 years (DISCOVER 2). Mean Hgb levels and number of patients with anemia (Hgb <13.5 g/dL males ; <12.0 g/dL females were assessed by treatment group through 1 year. A logistic regression model estimated ORs and 95% CI for achieving anemia resolution (anemia at baseline [BL] but not W24). The binary endpoint was anemia responder status at W24 (Y/N); predictors examined included age, sex, SJC/TJC and CRP.

Results: Approximately 24% of Males (N=136) and Females (N=120) patients were anemic at BL. Patients with anemia at BL had more SJC and TJC, CRP, and fatigue than patients without anemia. For both GUS groups, mean Hgb levels increased from BL through W52 for males and females, particularly among patients who were anemic at BL. For PBO patients, following PBO®GUS at W24, they increased to levels similar to GUS-randomized patients at W52. The proportions of males and females meeting criteria for anemia decreased over time (Figure). Patients with anemia resolution comprised more males, had shorter duration of PsA and lower CRP levels at BL than pts with unresolved anemia at W24. Females and patients with higher BL CRP levels were significantly less likely to achieve anemia resolution at W24 than males and pts with lower BL CRP, respectively. Patients with anemia resolution (N=112) appeared to exhibit better outcomes at W24 than patients with unresolved anemia (N=136), with numerically fewer mean SJC [6.76] vs 6.2 [8.01]) and TJC (10.7 [11.07] vs 12.5 (11.89]), less CRP (0.8 [0.92] vs 2.3 [2.73]), and less fatigue (FACIT-F 37.4 [10.60] vs 33.0 [10.45]).

Conclusion: GUS treatment through 1 year increased Hgb levels and lessened the prevalence of anemia. Anemia resolution was more likely in males and patients with lower CRP levels at BL and was associated with improved clinical status relative to patients with persistent anemia.

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Prevalence of Pre-existing Autoimmune Conditions in Metastatic Melanoma Patients Starting Immune Checkpoint Inhibitors

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Objectives: Since patients with pre-existing autoimmune conditions are commonly excluded from clinical trials with immune checkpoint inhibitors (ICI), we aimed to describe the characteristics of ‘’real-world” metastatic melanoma patients diagnosed with autoimmune conditions and starting ICI.

Methods: Using US administrative health claims data from MarketScan, we identified a cohort of adults with metastatic melanoma (based on International Classification of Diseases, ICD physician billing or hospitalization diagnostic codes) who started ipilimumab (IPI), pembrolizumab (PEM), nivolumab (NIVO), or IPI/NIVO over Jan. 2012-July 2019. Cohort entry was defined as the date of first prescription for one of these drugs. Inclusion criteria required health/drug plan coverage for 12 months before cohort entry. Pre-existing autoimmune conditions were identified within the 12 months before cohort entry, based on >1 ICD physician billing or hospitalization diagnostic code for the condition of interest.

Results: We studied 3409 adults with metastatic melanoma (2071 male). Over a quarter (N=908, 26.6%) had pre-existing autoimmune conditions at baseline. Of these, the most frequent was hypothyroidism (N=380), myopathy and myositis (N=76), type I diabetes mellitus (N=44), rheumatoid arthritis (N=36) and vitiligo (N=24). Pre-existing autoimmune conditions were more frequent in women versus men (31.9% vs 23.2%). There was no clear difference in the proportion of patients with pre-existing autoimmune disease among the newly diagnosed metastatic melanoma patients when we compared from one year to the other (from 2012 until 2019). There was a non-significant trend towards fewer patients with pre-existing autoimmune conditions in patients treated with combination IPI/NIVO (22%) versus ICI monotherapy (IPI 26%, NIVO 29% and PEM 28%).

Conclusion: Pre-existing autoimmune conditions are present in a considerable number of metastatic melanoma patients receiving ICI. Combination therapy with IPI/NIVO improves outcomes in metastatic melanoma, though with more frequent adverse events. Pre-existing autoimmune conditions might be seen by clinicians as a relative contraindication for combination ICI, but this should be evaluated in future studies.

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INvestigation of the Immune Endophenotypes of Early Rheumatoid Arthritis With Single-cell RNAseq Analysis of Patient's PBMC

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Objectives: Rheumatoid Arthritis (RA) is an auto-immune disease well-known for the uncertainty of treatment response hence the hypothesis of a plurality of immune endophenotypes all leading to a commun RA diagnosis. The project firstly aims to compare the RNA expression profile of immune cells from several RA patients to determine and characterize their distinct immune endophenotypes. Then, the most relevant biomarkers for each endophenotype will be used to create a tool capable of relating a new expression profile to a characterized endophenotype. For now, although various studies have looked at immune cell RNA expression in RA, too few combine the resolution level of using single-cell RNA sequencing (scRNAseq) and the unbiased expression of untreated patients.

Methods: To conduct this project, scRNAseq data have been generated from peripheral blood mononuclear cell samples of patients presenting with RA, before initiation of treatments. The point of using resolution at the cellular level is that different cell types are activated and act differently during symptomatic flares. For the bioinformatics analysis pipeline, after a step of quality-filtering, cells are clustered using the Leiden algorithm and the differentially expressed genes for each cluster are computed to find a cell type annotation.

Results: For now, two scRNAseq samples (a control and an untreated RA at diagnosis) of around 200 million reads each were used to build the bioinformatics analysis pipeline. As a preliminary study, several clustering methods were tested concluding that the unsupervised Leiden algorithm presented the best results. Moreover, the quality of the cluster annotation was evaluated while artificially reducing the input number of reads showing robust quality until around 50%. Finally, the genes differentially expressed between the whole two samples were computed as if it was regular bulk-RNAseq and the cellular pathways related to those genes were fetched showing as expected enrichment in immune pathways.

Conclusion: This unique project aiming at comparing RNA expression between untreated RA at diagnosis patients is yet in its early steps. However, the construction of the bioinformatics pipeline and the preliminary analysis show interesting results and have laid the groundwork for the analysis of new samples. The enriched cellular pathways recently found in a first intention approach tend to show the need for a more profound analysis comparing RNA expression of specific cell subtypes which will be explored in the near future thanks to the single-cell method used in this project.

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Novel Variants in RELA Driving Familial Chronic Mucocutaneous Ulceration Resembling Behcet's Disease: A Case Series

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Introduction: Recently, monogenic forms of Behcet disease (BD) have been described. Here we report two families with novel variants in the RELA gene driving monogenic Behcet's-like disease.

Case Descriptions: Family I: A 29-year-old female was seen at St Michael's Hospital, Toronto, for childhood-onset orogenital ulcers and flares of body pains. Tests revealed elevated inflammatory markers during flares, but negative/normal ferritin, ANA, ENA, C3/4, RF, and serum amyloid A. Her mother, two maternal aunts, maternal grandmother, and her 9-year-old son had similar symptoms. The patient was started on colchicine and etanercept for presumed BD, leading to a significant improvement in orogenital ulcers.

Exome sequencing revealed a novel variant in RELA (c.1144C>T, p.Gln382*), shared between the proband and her son. Pathogenicity was bioinformatically suggested by its absence in control databases, CADD score of 31, and a low observed: expected score (0.038) indicating haploinsufficiency. The variant introduces a premature termination codon within the Transcriptional Activation Region, predicted to lead to a truncated protein that disrupts NF-kB signaling. ClinVar lists several other loss-of-function variants in RELA as pathogenic. The variant thus met criteria for "Likely Pathogenic" according to the American College of Medical Geneticists (ACMG) classification.

Family II: A family was referred to the National Institutes of Health for an undifferentiated inflammatory disease in a father and six (of his nine) children. Clinical features included orogenital ulcers, arthralgias, fatigue, rash, and folliculitis in most affected members. Lab findings (in some) included elevated inflammatory markers and positive ANA. All six affected children were diagnosed with BD and received various immunomodulatory medications.

A gene panel performed in five affected individuals (two were unavailable for testing) revealed a shared heterozygous frameshift mutation (c.1311_1312insA, p.E438Rfs*9) in RELA. The frameshift is predicted to result in a truncated protein, impacting function. Pathogenicity of this variant was suggested by its absence in control databases, a low observed:expected score (0.04; pLI of 1), and "Likely Pathogenic" classification by ACMG.

Discussion: RELA belongs to the NF-kB family and is a key homeostatic regulator of mucosal immunity and integrity. Pathogenic variants of RELA may either reduce protein expression or generate truncated RELA proteins with impaired function. This dominantly inherited immune dysregulatory disorder resembles BD where the range and severity of manifestations depend on the specific variant. These cases illustrate the utility of genetic studies in patients with undifferentiated systemic inflammatory disease, for which the molecular diagnosis can inform treatment choices as well as family planning.

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COVID-19 Vaccine Uptake among Individuals with Immune-Mediated Inflammatory Diseases

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Objectives: Ontario's COVID-19 vaccination program commenced in December 2020, initially prioritizing seniors 80 years and older. On April 27, high density 'hot spot' regions began vaccinating adults 45 years and older, and the provincial eligibility for immunocompromising health conditions commenced May 3-6 along with adults 50 years and older, before expanding to all ages on May 18. It is unknown whether individuals with Immune-Mediated Inflammatory Disease (IMID) have been adequately vaccinated or whether delays in uptake have occurred, which may be a result of vaccine hesitancy (owing to unknown safety and efficacy concerns in this population who were excluded from trials, negative experiences from prior vaccines, and the changing guidance on immunosuppressive treatment adjustments). We compared the COVID-19 vaccine uptake among IMID patients and the general population.

Methods: We studied all residents 16 and older who were alive and actively enrolled in the Ontario Health Insurance Plan (OHIP) on December 14, 2020 when the vaccination program began. Individuals with selected IMIDs - Rheumatoid arthritis (RA), Ankylosing spondylitis (AS), Psoriatic Arthritis (PsA), Psoriasis (PsO), Inflammatory Bowel Disease (IBD) - were identified using disease-specific case definitions applied to health administrative data. Vaccination status was extracted from the Ontario Ministry of Health's COVaxON data source between December 2020 and July 31, 2021. The weekly cumulative proportion of individuals with 1 dose and 2 doses (separately determined) up until the end of study period is expressed as the vaccinated proportion of each population.

Results: Our study population comprised 12,417,126 general population comparators, and 138,301 individuals with RA, 28,506 with AS, 17,645 with PsA, 182,299 with PsO, and 108,782 with IBD. By end of July 2021, the cumulative proportion with at least 1 dose was 77.7% for the general population, 86.6% for RA, 84.5% for AS, 88.4% for PsA, 84.1% for PsO, and 83.8% for IBD. The cumulative proportion with 2 doses by July 31 2021 was 68.4% among the general population, and ranged 76-82% for IMIDs (Figure). Among those vaccinated, the majority of individuals (72%) in both the general population and IMID groups received BNT162b2 (Pfizer-BioNTech) vaccines. The median interval between 1st and 2nd doses ranged between 60-70 days for BNT162b2, 53-61 days for mRNA-1273 (Moderna), and 70-74 days for ChAdOx1 nCoV-19 (AstraZeneca/COVISHIELD).

Conclusion: While implementation of COVID-19 vaccination programs has differed provincially, these Ontario estimates are the first to reassuringly show higher uptake and coverage of COVID-19 vaccines among IMID patients.

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Evaluating the Effects of Continuity of Rheumatology Care on Patient Outcomes for Individuals with Rheumatoid Arthritis

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Objectives: We examined whether continuity of rheumatology care influences survival, hospitalization, and emergency department (ED) visits for RA patients.
Methods: We studied a closed inception cohort of RA patients diagnosed between 2000-2009 (and a minimum of 2 rheumatology visits). Following cohort entry, rheumatology continuity was categorized into 3 mutually exclusive groups: 1) High Continuity (at least 2 rheumatology visits within first year, followed by annual rheumatology visits); 2) Intermediate (rheumatologist visit occurred during >50% of the measurement periods/years); and 3) Low (those not retained in rheumatology care). A landmark analysis (with the landmark set at 5 years from diagnosis-following exposure measurement period) was performed to separately determine all-cause mortality, unscheduled hospitalization, and ED visit rates determined from landmark date to end of follow-up (2019) for each group. To estimate rate ratios across exposure groups, modified Poisson regression models (with robust error variances) were used, adjusting for demographics, comorbidities, primary care continuity, and rheumatology access/supply measures. Excess mortality was obtained by subtracting the mortality in the general population from the observed age/sex mortality rate in each RA group.
Results: Among 38,528 (95.5%) incident RA patients who survived until the landmark date, 22,221 (57.7%) were categorized as having high continuity, 6,636 (17.2%) as intermediate, and 9,671 (25.1%) as low. The high continuity group had a higher proportion of females, residents from urban areas, and higher socioeconomic status. Across all outcomes, the intermediate group had the highest rates. Age/sex adjusted mortality rates were 22.8 (95% CI 21.8-23.7), 26.2 (95% CI 25.0-27.7), and 23.5 (95% CI 23.3-23.8) deaths per 1000 PY for the low, intermediate, and high groups, respectively (Table). High and low continuity age/sex adjusted mortality rates were not statistically different. However, relative to the high group, mortality rate ratios were 0.95 (95% CI 0.9-1.00) for low, and 1.05 (95% CI 1.00-1.11) for intermediate. The observed general population mortality rate was 19.4 deaths (95% CI 19.2-19.7) per 1000 PY and all groups had significantly excess mortality rates. For ED visits, the high continuity group had the lowest rates. For hospitalizations, the low continuity group had significantly lower rates and rate ratios.
Conclusion: RA patients with high continuity of rheumatology care have fewer ED visits, and improved survival. The lower rates for individuals who were not retained in rheumatology care likely reflect those with milder or time-limiting disease. However, all 3 groups portrayed higher excess mortality compared to the general population, underscoring the importance of rheumatology care.

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Disease Modifying Anti-rheumatic Drugs (DMARDs) and Biologic Therapy Use During Pregnancy: A Single-center Mixed Methods Study

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Objectives: Rheumatic diseases including inflammatory arthritis and connective tissue diseases can be associated with significant morbidity in women of child-bearing age. These diseases and their treatments can impact fetal and maternal outcomes. Although there is growing evidence to

support the safety of many anti-rheumatic drugs (ARDs) in pregnancy, patients often discontinue treatments in the peripartum period due to concern of fetal harm. This study sought to identify perinatal medication use patterns at a single tertiary care center and to understand patient perspectives surrounding their use.
Methods: Electronic medical records were reviewed for women attending the rheumatic diseases in pregnancy clinic, a rheumatology clinic with subspecialty input, at St. Michael's Hospital in Toronto, Canada, from January 2013 until March 2020. A 12-item questionnaire was administered to women attending this clinic from January 2018 until September 2021. Data was analyzed using descriptive statistics.
Results: Thirty-eight women and forty-five pregnancies were identified, with rheumatoid arthritis (N=12, 32%), systemic lupus erythematosus (N=18, 27%) and seronegative arthritis (n=8, 16%) representing the majority. Twenty-nine patients (60%) were exposed to disease modifying anti-rheumatic drugs (DMARDs) and eight patients (16%) were exposed to biologics during pregnancy. Of those who experienced peri-partum medication changes, the highest proportion (57%) occurred pre-partum. Patients who received pre-pregnancy counselling were more likely to undergo medication adjustments prior to conception and were more likely to utilize a DMARD or biologic during pregnancy. Our survey was completed by 22 respondents. Nineteen women (86%) reported that they would consider ARD use in pregnancy with the highest degree of comfort reported for DMARDs (N=19, 86%), compared to steroids (N=3, 14%), non-steroidal anti-inflammatory drugs (N=6, 27%) and biologics (N=3, 14%). Seventeen participants felt that their questions were answered by health care providers, with the majority (82%) describing their rheumatologist as their primary information source. 41% did not feel that the provided resources were adequate to assist with their decisions about medication use in pregnancy.
Conclusion: While the majority of women in our cohort continued on ARDs during pregnancy, most survey respondents reported discomfort with use of many ARDs, particularly, anti-TNF biologics. This discrepancy between patient perspectives and available evidence is important to consider when counseling patients on ARD use in pregnancy. Respondents relied on their rheumatologist as their primary information source, highlighting the important role specialists can play in informing patient decisions. Resources provided to patients in this area were perceived as inadequate by many individuals, demonstrating an area for future improvement.

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IgG4-Related Prostatitis Manifesting as Urinary Obstruction in a 28-Year-Old Male

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Background: Immunoglobulin G4-related disease (IgG4-RD) is a systemic lymphoproliferative disorder characterized by elevated serum IgG4 levels and tumefactive lesions which can involve nearly every organ system. Involvement of the prostate is rare but has been reported in limited cases.
Case Presentation: A 28-year-old man of Asian descent with a history of sinusitis and priapism presented to hospital with rigors and obstructive urinary symptoms. He was diagnosed with

IgG4-RD one month prior to presentation, following pathological analysis of a submandibular mass which demonstrated chronic sclerosing sialadenitis. On presentation, white blood cell count, C-reactive protein, and prostate serum antigen levels were all within normal limits. Examination was notable for a large, firm prostate, and a foley catheter was inserted. Contrast CT of the abdomen was unremarkable. Further workup revealed elevated serum IgG4 levels (9.22 g/L) and he was subsequently started on prednisone 35 mg daily. Imaging to screen for systemic IgG4-RD involvement demonstrated paravertebral soft tissue involvement and he was given a dose of rituximab 1000 mg IV. MRI revealed diffuse prostatitis. Five days after starting prednisone and one day after receiving rituximab, he successfully passed trial of void and was discharged home.

Conclusions: IgG4-related prostatitis is a rare and underrecognized manifestation of IgG4-RD. Our case highlights the need to consider IgG4-related prostatitis as an etiology of urinary obstruction in young individuals. Resolution of symptoms following treatment with steroids may be diagnostic of IgG4-related prostatitis, and may potentially avoid the need for invasive diagnostic procedures such as prostate biopsy.

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More than Meets the Eye: A Case of Retinal Vasculitis in SLE

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Background: While retinal vasculitis as a primary manifestation of SLE is uncommon, SLE also accounts for only 4% of cases of retinal vasculitis. Here, we present a case of a young female with SLE, who primarily presented with retinal vasculitis and raised intracranial pressure.

Case presentation: A 26-year-old female presented with a one-month history of bilateral decreased visual acuity and 3-month history of headache. Ophthalmology assessment showed bilateral enlarged blind spots, and dilated fundus exam (Figure 1a) revealed bilateral disc edema and peripapillary hemorrhages with cotton wool spots in the left eye. A fluorescein angiogram (Figure 1b) revealed significant retinal vasculitis involved both the arteries and veins in the left eye. A CT venogram was unremarkable. Cranial and orbital MR imaging showed hyperintensity of the intracanalicular optic nerve segments, and punctate hyperintense signal changes in the subcortical white areas of the brain. The cerebrospinal fluid (CSF) analysis revealed an elevated opening pressure, leukocyte count of 17 x 10E6/L, red blood cell count of 1 x 10E6/L, protein of 0.24 g/L, with negative gram stain and cytopathology. Her infectious and malignancy workup were unremarkable.

She was also investigated for underlying autoimmune etiology. As she had thrombocytopenia (platelet 92 x 10E9/L), leukopenia (white blood cell 2.7 x 10E9/L), positive antinuclear antibody (≥1:640, speckled pattern), +anti-dsDNA, +anti-Smith, and hypocomplementemia, she was diagnosed with SLE and had also met the 2012 Systemic Lupus International Collaborating Clinics (SLICC) classification criteria for SLE. She also had antibodies to chromatin, Smith (Sm), Sm/ribonucleoprotein (RNP), and RNP-68.

She was initially treated with pulse methylprednisolone for three days and then prednisone, hydroxychloroquine, and mycophenolate mofetil. However, her follow-up retinal assessments over the next month showed only a partial reduction in her retinal vasculitis with persistent paracentral scotoma so she was promptly switched to cyclophosphamide. Although both mycophenolate mofetil and cyclophosphamide have been shown to reduce vasculopathy and

resolve cotton wool spots, there is limited evidence to support their role in preventing the progression of retinal vaso-occlusion. A repeat retinal assessment is currently pending.
Conclusion: This case highlights the need to consider a broad differential diagnosis for retinal vasculitis, including SLE. Retinal vasculitis in SLE, although uncommon, can be the first manifestation of SLE and needs to be recognized early so that timely, aggressive treatment can be initiated.

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A Rare Case of Interstitial Lung Disease in Type I Cryoglobulinemic Vasculitis

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Type 1 cryoglobulinemic vasculitis is a subtype of cryoglobulinemic vasculitis characterized by precipitated immunoglobulin complexes that circulate in plasma and may occlude medium- and small-sized vessels. Commonly affected organ systems include the skin, kidneys, and peripheral nervous system. Pulmonary system involvement is rare.

A 42-year-old man was admitted to hospital in the Spring of 2020 when he presented with purpuric lesions, fingertip ulcerations, arthritis and dry cough. He was found to have type I cryoglobulinemia secondary to paraproteinemia via monoclonal gammopathy of undetermined significance (MGUS), kappa light chain IgG subtype. A CT chest at that time was normal. He initially responded to steroids and he was prescribed cyclophosphamide. This was stopped due to profound neutropenia requiring dose reduction and Filagistrim. Steroids were tapered. At review by Hematology, it was felt that intervention was not indicated for his MGUS. During this period of time his cough progressed and he developed dyspnea on exertion. He was then referred for management to a combined Rheumatology & Respirology clinic.

Upon review at the combined clinic he was found to be hypoxic and CXR demonstrated mixed interstitial and airspace disease. His presenting symptoms of fatigue, night sweats, digital ischemia and purpuric lesions had returned. He was reinitiated on prednisone. A follow-up CT revealed continued bibasilar opacities, ground-glass changes, and septal thickening. COVID-19 screen was negative. Bronchoscopy and bronchoalveolar lavage were negative for alveolar hemorrhage and infection. Surgical lung biopsy revealed organizing pneumonia with fibrosis. At this point an application for Rituximab was made and prednisone was increased to 50 mg with clinical response. A follow-up pulmonary function test revealed improved but persisting moderately-severe restrictive impairment, with significant diffusion impairment (44%). Currently, he is much improved clinically and has been able to return to work. Over four months, his cutaneous manifestations improved and are now managed with calcium channel blockers.

This case illustrates a unique scenario of interstitial lung changes in the context of type I cryoglobulinemic vasculitis; although pulmonary vasculitis may be associated with diffuse alveolar hemorrhage, interstitial lung changes are not commonly encountered. This case shows an example of interstitial lung changes in context of cryoglobulinemic vasculitis that responded to treatment with high-dose steroids and Rituximab.

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miR-190a-5p and miR-26b-5p Are Potential miRNA Biomarkers for Psoriatic Arthritis

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Objectives: Psoriatic arthritis (PsA) is an immune-mediated inflammatory arthritis, that develops in up to 30% of psoriasis patients. PsA significantly increases morbidity and may increase mortality risk. Early diagnosis and prompt management of inflammation are essential for preventing joint damage and disability. However, we currently lack the means of predicting which psoriasis patients will develop PsA, and a large number of patients remain undiagnosed. Micro RNAs (miRNAs) regulate gene expression and have been associated with the pathogenesis of immune-mediated disorders. With this research, we identified miRNAs associated with the development of PsA.

Methods: We obtained serum samples from 28 PsA patients satisfying CASPAR criteria, 35 cutaneous psoriasis patients (PsC, confirmed not to have PsA by a rheumatologist), and 28 healthy controls. miRNA expression was assessed through next-generation sequencing. Total RNA was isolated from serum samples, miRNA sequencing libraries were prepared and sequenced on an Illumina HiSeq2500 following the 75 base-pair single read protocol, at a depth of 12-13 million reads/sample which allows detection of low expressed transcripts. After quality control, reads were aligned to known human miRNA sequences (miRbase version 22). miRNAs with low expression (10 counts in at least 20 samples) were excluded from further analysis. Differential expression was assessed by linear modelling with empirical Bayes moderation as implemented in the Limma R package. Models were corrected for sequencing batch, age, sex and duration of psoriasis. Identification of miRNA gene targets was carried out using the microRNA Data Integration Portal (mirDIP) and enrichment of specific biologic pathways was examined using the pathway Data Integration Portal (pathDIP). Analysis was restricted to literature curated pathways and experimentally detected protein-protein interactions with a prediction confidence of 0.99.

Results: Two miRNAs (miR-190a-5p and miR-26b-5p) were significantly down-regulated in PsA patients when compared to healthy controls (FDR-adjusted p-value < 0.05, Figure 1). Expression levels of miR-190a-5p were also significantly lower in PsA patients compared to PsC patients. Significantly enriched pathways targeted by both of these miRNAs included canonical and non-canonical Wnt, TGF beta, and Hedgehog signaling pathways.

Conclusion: We identified serum expression levels of miR-190a-5p and miR-26b-5p as potential biomarkers for the development of PsA.

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Reduced IgG Sialic Acid Content: A Distinctive Characteristic of Symptomatic Anti-Nuclear Antibodies Positive Individuals

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Objectives: Currently the immune changes that lead to the transition from asymptomatic Anti-Nuclear Antibody (ANA) positivity to symptomatic disease are unknown. Studies in our laboratory revealed that increased levels of proinflammatory factors, particularly TNF-a, are restricted to symptomatic ANA+ individuals. Based upon this observation and the similarities between the ANA-associated SARDs (Systemic Lupus Erythematosus (SLE), Sjogren's Syndrome, and Systemic Sclerosis) and Rheumatoid Arthritis, where progression from asymptomatic to symptomatic autoimmunity is associated with reduced sialylation of the IgG Fc region and accumulation of pro-inflammatory cytokines, herein we proposed to investigate whether or not a similar shift in sialylation occurs as asymptomatic ANA+ individuals progress to SARD.

Methods: An enzyme-linked lectin assay was developed that uses Sambucus Nigra Agglutinin, a lectin that binds sialic acid, to detect sialylated IgG. This assay was then used to determine the extent of sialylation on IgG purified from the plasma of 10 ANA- healthy controls (ANA-HC), 15 ANA+ asymptomatic (ANA+NS) individuals, and 15 SLE patients. Differences is the ability of the IgG to elicit inflammation between the ANA+ groups were investigated by stimulating monocyte derived dendric cells (moDC) from ANA-HC with aggregated IgG. IL-6 and TNF-a in the culture supernatants and serum were measured by ELISA. Cellular profiling of peripheral blood immune populations was performed using flow cytometry.

Results: The sialic acid content of IgG was significantly reduced in SLE patients compared to ANA+NS individuals ($p= 0.0229$) and ANA-HC ($p= 0.0012$) (Figure 1A). There was a negative correlation between sialylation of IgG and serum levels of TNF-a ($rho= -0.54$, $p= 0.0039$) and proportion of T follicular helper cells ($rho= -0.37$, $p= 0.032$) (Figure 1B) in the patients from which the IgG was purified. When moDC were stimulated with heat-aggregated IgG from ANA+NS and SLE patients, there was a trend to increased production of these cytokines, as compared to heat-aggregated IgG from ANA-HC, which was statically significant for TNF-a ($p= 0.008$) (Figure 1C) in SLE. The levels of TNF-a produced in response to heat-aggregated IgG demonstrated a negative correlation with the extent of IgG sialylation ($rho= -0.5$, $p=0.02$) (Figure 1D).

Conclusion: The reduced levels of sialylated IgG and their association with increased levels of TNF-a production in SLE patients, as compared to ANA+NS individuals and ANA-HC, are

compatible with the concept that de-sialylation of IgG promotes the transition from asymptomatic to symptomatic autoimmunity in SARD.

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Rheumatology Virtual Triage: Factors Determining Patients' Appropriateness for In-person or Virtual First Triage Visit

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Objectives: 1. To measure the conversion rate of virtual rheumatology visits to in-person (IP) visits between: o March – May 2020: All new consultations were assessed virtually during wave 1 of the pandemic. o June – November 2020: Post intervention. 2. To identify reasons for conversion of virtual visits to IP, recognize common features of a successful virtual visit as well as design future interventions to decrease conversion rate to incorporate telemedicine more effectively in rheumatology practice.

Methods: • Primary outcome: Conversion rate of virtual visits to IP at baseline and post intervention. • Intervention: A change to the triaging algorithm was made where the first 2 urgent categories were booked preemptively as IP initial visits (i.e., vasculitis, inflammatory arthritis, SLE & acute gout) in June 2020. • We reviewed and collected data from 20 patients' charts who were assessed virtually pre intervention (Mar – May 2020) and 20 patients' charts who were assessed post intervention (June – Nov 2020).

Results: • Conversion rates from virtual visits to an IP visit were: o Mar – May 2020: 53% for new visits & 12% for follow up visits. o June – Nov 2020: 25% for now visits & 15% for follow up visits. • Physical examination and bedside procedures were the only causes for conversion: o Physical exam was the major cause for conversion of new consults (80%) & majority of these new referrals were phone consults. o Bedside procedures were the major cause of conversion of follow up visits (66.6%).

Conclusion: • Virtual care can be very effective in rheumatology practice in providing follow up and new consultations. • Studies are needed to validate the virtual rheumatologic examination. • Future interventions are needed to decrease conversion rates. • We will continue to collect data on utilization of investigation. • The rate of conversion rate was largely affected by the pandemic case counts and the hospital capacity to accommodate in-person visits.

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Implementing the EIA Detection Tool to Improve Triage Accuracy and Reduce Wait Times: A Quality Improvement Project

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Objectives: Rheumatology has one of the longest wait times for subspecialists in Ontario, exacerbated by the shift to virtual care during the COVID-19 pandemic. Long wait times lead to delays in treatment and may increase joint damage. The objective of this quality improvement study was for all urgent rheumatology patients in our new community clinic to be seen within 4 weeks of referral by July 31st, 2022. The first phase of our project, funded by a CRA Summer Studentship, aimed to develop and test one change idea by August 20, 2021.

Methods: Our study design was based on the Model For Improvement with Plan-Do-Study-Act (PDSA) cycles. Outcome measures were consultation wait times and referral triage accuracy. After establishing baseline performance, we conducted a root cause analysis through fishbone diagramming and process mapping with stakeholders. Change ideas were developed using a

driver diagram and PICK chart. We focused on improving the triage accuracy of unclear referrals by asking patients to complete the validated Early Inflammatory Arthritis (EIA) Detection Tool through an online process before scheduling their appointment. In PDSA 1, we tested the process with one mock patient. In PDSA 2, we modified instructions and tested it with four patients who had unclear referrals. In PDSA 3, we refined the administrative process and continued testing over four weeks.
Results: We conducted a baseline analysis using run charts and descriptive statistics for 1237 referrals between April 2020 -June 2021. Referrals were assigned a pre-consult score based on urgency: P1 (emergent), P2 (urgent), P3 (non-urgent), P4 (elective). A post-consult score (P1-P4) was assigned based on rheumatologist diagnosis after initial consultation. Baseline triage accuracy was 73%, and more non-urgent cases were expedited (24%) than urgent cases delayed (14%). Average wait times for urgent cases increased from 11 days in August 2020 to 44 days in August 2021. Root cause analysis suggested that inaccurate triage may be contributing to lengthening wait times. We implemented the new triage process in August 2021. Over four weeks, 13/72 referrals (18.1%) had unclear urgency. All 13 patients completed the EIA Tool within two days. Most patients (12/13, 92.3%) scored above the EIA cut-off; however, we have not yet evaluated post-consultation triage accuracy.
Conclusion: We implemented the validated EIA Detection Tool into our triage process. Next, we will evaluate whether the process improves triage accuracy and reduces wait times for urgent referrals.

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Pain Experiences and Decision-Making Needs for Pain Management Among Young Women with Hypermobile Ehlers-Danlos Syndrome and Generalized Joint Hypermobility Spectrum Disorder

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Objectives: Pain is one of the most common symptoms experienced by individuals with hypermobile Ehlers-Danlos syndrome (hEDS) and generalized hypermobility spectrum disorder (G-HSD). Understanding decision-making needs is crucial to develop interventions to help patients better manage their condition. Yet, little is known about the experiences and needs of these young women. We wished to describe experiences of pain, as well as decision-making needs related to pain management among young women with hEDS and G-HSD.
Methods: Using a qualitative descriptive study design, we conducted semi-structured virtual interviews of young women diagnosed with hEDS or G-HSD aged 18 to 30 years of age. Participants were recruited through social media. Interview guide questions were based on the Ottawa Decision Support Framework. Interviews were audio-recorded, transcribed verbatim and analyzed using simple content analysis.
Results: 10 women with hEDS and four women with G-HSD participated in the interviews. Of those, nine had postural orthostatic tachycardia syndrome, three had mast cell activation syndrome and two had rheumatic conditions (i.e. juvenile idiopathic arthritis and ankylosing spondylitis). Participants regularly experienced various types of pain: musculoskeletal (n = 14, mean = 6 on a scale of 0 [no pain] to 10 [worst pain]), gastrointestinal (n = 13, mean = 4.69), headaches/migraines (n = 12, mean = 5.71) and neuropathic (n = 5). The following themes emerged: (1) Complexity of hEDS and G-HSD pain; (2) Multidimensional impact of pain; (3)

Desperation for pain relief; (4) Satisfaction of their pain management strategies; (5) Lack of patients' and healthcare providers' knowledge on diverse pain management options; (6) Lack of communication and decision support about pain management from healthcare providers; (7) Desire for shared decision making.
Conclusion: This study revealed the important impact of hEDS and G-HSD pain on the daily lives of individuals and the unmet decisional needs for evidence-based information and communication about pain management strategies. These findings can inform the development of a decision support intervention to support decision-making on pain management options.
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Beyond the VAS in Rheumatoid Arthritis: Results From a Multi-modal Pain Assessment Pilot Study
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Objectives: Pain is a common experience amongst Rheumatoid Arthritis (RA) patients and their first-degree relatives (FDR), but objectively measuring pain remains a challenge. To better understand how to capture and quantify pain, we sought to undertake a multi-modal pain assessment pilot study.
Methods: In this pilot study, we enrolled 15 RA patients and 14 FDR (n total = 29), and recorded baseline demographics. QST, which included pressure pain threshold (PPT) and temporal summation (TS) was performed. Participants completed a digital pain map using custom software on an Android Tablet to capture pain location and intensity on an electronic homunculus. Pain map scores were calculated using a weighted formula. We analyzed the data using Wilcoxon signed rank test, chi-square, spearman rank correlation and linear regression where appropriate.
Results: The median age for FDR and RA were 43 and 44 years respectively. There were no differences in trapezius PPT (4.62 kgf IQR 2.8 vs 4.09 kgf IQR 4.9, p=0.631) or forearm TS (1.67 IQR 2.3 vs 2.34 IQR 2.3, p = 0.497) between RA and FDR. Peripheral sensitization was also similar between RA and FDR, with no differences in joint and non-joint PPT (all p-values > 0.05). VAS pain was higher in RA (64 IQR 44.5) compared to FDR (29 IQR 57), but this did not reach statistical significance (p = 0.335). Digital pain map scores were significantly higher in RA patients (29.7 IQR 24.0) compared to FDR (8.7 IQR 16.2, p = 0.009). Pain map score correlated strongly with mHAQ score, a standardized measure of functional disability (R = 0.78, p < 0.001). No significant association between PPT or TS and mHAQ was observed (R = -0.16, R = 0.28 respectively). Using linear regression, we found that pain map score was independently associated with mHAQ after controlling for age, sex, opioid use, and RA diagnosis (ß = 1.30, 0.61 to 1.99, p < 0.001).
Conclusion: Digital pain maps are a novel and feasible method to capture pain that distinguishes RA patients from FDR and is closely associated with functional disability. Central and peripheral sensitization were similar between RA and FDR, suggesting that changes to pain processing may occur in individuals at risk of developing RA in the absence of joint inflammation.
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Diagnostic Testing in IgG4-related Disease
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Objectives: We compared the performance characteristics of Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) and Binding Site Immunonephelometry (BSIN) to aid in the diagnosis of IgG4-related disease (IgG4-RD) in an extension analysis.
Methods: We analyzed a total of 881 IgG4 measurements taken between December 2011 and December 2020, which were collected from provincial laboratory providers. The ACR/EULAR criteria were used to determine whether patients were positive for IgG4-RD. Using this data, we compared LC-MS/MS and BSIN according to sensitivity, specificity, positive and negative predictive values, and Area Under the Curve (AUC) of their respective Receiver Operating Characteristic (ROC) curves. Sensitivity and specificity calculations were derived from the optimal thresholds defined by the Youden index.
Results: IgG4 measurements were taken using BSIN for 43 IgG4-RD positive cases and 174 disease negative cases. IgG4 measurements were taken using LC-MS/MS for 102 IgG4-RD positive cases and 562 disease negative cases. The specificity of BSIN and LC-MS/MS was 92.53% and 86.30%, respectively. The sensitivity of BSIN and LC-MS/MS was 79.07% and 86.27%, respectively. The AUC of BSIN and LC-MS/MS was 90.36% and 92.16%, respectively.
Conclusion: In this larger study, we found that BSIN performed slightly better than LC-MS/MS in terms of specificity, whereas LC-MS/MS performed slightly better than BSIN in terms of sensitivity. LC-MS/MS remains an important, alternate test method for the diagnosis of IgG4-RD. Best Abstract on Research by an Undergraduate Student Award.
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Developing a Novel 3D Printed Knee Model for Teaching and Learning Ultrasound-guided Knee Joint Arthrocentesis and Injection

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Objectives: Knee joint arthrocentesis and injections are essential procedures amongst medical trainees. However, previous studies have found medical providers lack competency and confidence in performing these procedures. Knee joint simulators can improve learner experience, confidence, and learning outcomes with joint injections and aspirations. However, commercially available simulators are expensive, thus limiting their access and use in medical training. We have developed a novel cost-effective 3D-printed knee model as an alternative simulation tool for use in medical education. The aim of this study was to utilize an expert feedback driven approach to develop and refine our 3D-printed knee model as a tool for teaching ultrasound (US) guided knee joint injections and arthrocentesis.
Methods: An US session was conducted by a point of care US expert (n=1) using the 3D printed knee simulator and a human knee joint as a comparator. Still images and cineloops were obtained of the simulator and human knee using a high frequency (6-13 MHz) linear transducer (X-PORTE, FUJIFILM Sonosite, Inc., Bothell, WA). Qualitative feedback was collected to assess anatomical fidelity (sonographic resemblance) and overall user experience.
Results: Comparative images were obtained from several standard anatomical sites on both the

simulation and real knee joints (Figure 1). Based on expert feedback, the overall length of the suprapatellar region was felt to be too short, but did not limit sonographic evaluation. Presence of a hyperechoic structure limited far field visualization in both the suprapatellar and the infrapatellar region. The patella and joint lines were readily visualized with confidence. US imaging on the simulator required the use of maximum gain, which limited user experience.
Conclusion: Further development and refinement of the 3D printed model is required to improve visualization of the femur, as well as differentiation of musculature from synovial fluid and periarticular structures. Our plan is to improve the existing model utilizing this expert feedback and then obtain further qualitative data from a panel of US experts and rheumatologists on our improved prototype. Ultimately, our goal is to develop a cost-effective and realistic knee simulator that can be used to teach medical trainees US-guided knee joint injections and aspirations.

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Greater Preeclampsia Knowledge in SLE with a Specific Educational Tool: Interim Analyses

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Objectives: Pregnant women with systemic lupus erythematosus (SLE) are at high risk of preeclampsia, leading to substantial maternal and fetal morbidity. Aspirin reduces preeclampsia risk but recent studies suggest aspirin is used only in a minority of SLE pregnancies. It is necessary to improve preeclampsia counselling and management in this population. Therefore, we are conducting the PREPARE (PREeclamPsia knowledge & Aspirin adheRence in lupus prEgnancies) trial, a randomized controlled trial (RCT), evaluating an educational tool on preeclampsia knowledge and aspirin adherence in SLE pregnancies. We present interim analyses of this tool's effect on preeclampsia knowledge.
Methods: We are recruiting consecutive pregnant SLE women up to the 16th gestational week at 5 Canadian SLICC centres (i.e., Montreal, Halifax, Quebec, Winnipeg, and Calgary) since May 2018. Participants are randomly assigned to receive either the specifically-designed educational tool (intervention) or standard of care (control). At baseline (i.e., first trimester) and second trimester visits, the participants completed self-administered preeclampsia knowledge questionnaires (scored out of 30 by the research team blinded to the intervention). The current analyses include participants enrolled at the coordinating center, accounting for nearly half of the total planned sample size. We performed a univariate linear regression analysis to assess the effect of the educational tool on preeclampsia knowledge (i.e., mean score difference between the two groups from baseline to second trimester visit).
Results: Thirty-eight pregnant SLE women were included in the study, with 20 exposed to the intervention. Baseline characteristics were well-balanced between the two groups with similar mean maternal age between the intervention (32.9 years, standard deviation, SD, 4.6) and control group (34.2 years, SD 4.1) and proportion of participants with post-secondary education (Table 1). The difference in mean preeclampsia knowledge scores between second trimester and baseline visits in the intervention group was 5.3 points (95% CI 1.6, 8.9) and in the control group

was 0.9 points (95% CI -2.9, 4.7). The mean difference in knowledge scores for those receiving the educational tool was 4.4 points higher (95% CI 0.6, 8.2) than those receiving standard of care.
Conclusion: Approximately midway into the trial, we observed an improvement in preeclampsia knowledge from baseline to second trimester visit in pregnant women with SLE who received the educational tool compared to those who did not. Our RCT is well-poised to provide a new evidence-based approach to improve preeclampsia knowledge in pregnant women with SLE, which could help to optimize aspirin use and outcomes in SLE pregnancies. Supported by a CIORA grant.

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Higher Prevalence of Aspirin Use with a Specific Educational Tool in SLE Pregnancies: Interim Results

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Objectives: Pregnant women with SLE are at substantial risk of preeclampsia. International practice guidelines recommend aspirin (ASA) in this population as it has shown to halve preeclampsia risk in high-risk women. However, recent evidence shows that only a quarter of pregnant SLE women use ASA. It is therefore imperative to understand ASA use patterns to promote ASA adherence. To do so, we are conducting the PREPARE (PREeclamPsia knowledge & Aspirin adheRence in lupus prEgnancies) trial, a randomized controlled trial, evaluating a specifically-designed educational tool. We present the tool's effect on ASA use and adherence as well as ASA dosages used at the 2nd trimester visit according to the intervention status.
Methods: We are recruiting consecutive pregnant SLE women up to the 16th gestational week at 5 Canadian SLICC centres. Participants were randomly assigned to receive the educational tool (intervention) or standard of care (control). At baseline (i.e., 1st trimester) and 2nd visits (i.e., 2nd trimester for ongoing pregnancies or 4-8 weeks after miscarriage), the participants completed self-reported ASA questionnaires and the modified Adherence to Refills and Medications Scale (ARMS). We measured the proportion of ASA users, mean ARMS scores, and dosage at both visits. We estimated a 95% CI for difference in proportion of ASA users between the groups using the Wilson procedure and mean ARMS score difference between the groups using the student's test.
Results: Thirty-eight participants were included with 20 exposed to the intervention. Baseline characteristics, including maternal age and proportion of participants who had post-secondary education, were well-balanced (Table 1). Baseline ASA use prevalence was 65% and 44% in the intervention and control group, respectively. Proportion of ASA users at the 2nd visit was 100% in the intervention and 83% in the control group, with a difference of 17% (95% CI -2.7, 39.2). At the 2nd visit, mean ARMS score was not different between the two groups [difference of 0.3 points (95% CI -0.8, 1.4)]. Among ASA users who did not have miscarriage, 7% and 18% used 80-81mg, and 93% and 82% used 160-162mg in the intervention and control group, respectively.
Conclusion: Halfway into the trial, we observed a trend for higher ASA use in pregnant SLE women who received a specifically designed educational tool compared to those receiving

standard of care. The PREPARE trial is on track to provide a new evidence-based approach to optimize aspirin use and potentially improve outcomes in this population. Supported by a CIORA grant.

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Immunization Rates Among Rheumatoid Arthritis Patients in a Canadian Outpatient Clinic

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Objectives: To assess immunization rates among patients with rheumatoid arthritis taking JAK inhibitors and biologic agents in an outpatient clinical setting

Methods: We conducted a retrospective chart review of the electronic health records of patients at an urban rheumatology clinic between July 2010 to July 2021. Our study sample consisted of active and inactive patients diagnosed with rheumatoid arthritis who were previously or are currently being treated with the following classes of medications: JAK inhibitors (tofacitinib, upadacitinib, baricitinib), Anti-CD20 (rituximab), Anti-IL6 (tocilizumab, sarilumab), Anti-TNF (infliximab, etanercept, adalimumab, golimumab, certolizumab) and CTLA4-Ig (abatacept). We collected data regarding vaccination status for herpes zoster and pneumococcus and influenza vaccination within 12 months of their last clinic visit, in line with Canadian guidelines for immunization in patients who have immune mediated disorders or immunosuppression.

Results: 143 Active and Inactive Rheumatoid Patients were identified. The proportions of patients currently on or previously trialed JAK inhibitors, Anti-CD20, Anti-IL-6, Anti-TNF and CTLA4-Ig were 73.4%, 5.6%, 3.5%, 14.7% and 2.8%, respectively. In total, 84.6% of patients had received at least one dose of the herpes zoster vaccine while 62.9% and 7.7% of patients were immunized against pneumococcus and the influenza virus respectively. The rates of immunization varied vastly amongst different drug classes as follows: JAK inhibitors: herpes zoster 81.9%, pneumococcal 62.8% and influenza 6.7%; Anti-CD20: herpes zoster 87.5%, pneumococcal 87.5% and influenza 12.5%; Anti-IL6: herpes zoster 100%, pneumococcal 40% and influenza 40%; Anti-TNF: herpes zoster 95.2%, pneumococcal 61.9% and influenza 4.8%; CTLA4-Ig: herpes zoster 75%, pneumococcal 50% and influenza 0%

Conclusion: Immunization coverage has significantly improved across herpes zoster and pneumococcal vaccine types and medication subgroups. There has been an increase, compared to data collected in 2020, in herpes zoster immunizations among patients on anti-CD20, anti-IL6, anti-TNF and CTLA4-Ig drug classes. The immunization rate of herpes zoster vaccine in patients on JAK inhibitors has remained stable compared to the previous audit in 2020. The increase in herpes zoster vaccination uptake may have resulted from continued and further improved identification and surveillance of patients who do not have any documented vaccination. However, there has been a significant decrease in influenza vaccine uptake in all medication subgroups compared to the previous audit. Increasing the scale and scope of these efforts along with identifying other limiting factors to vaccine uptake is required to further improve vaccination rates and documentation for the pneumococcal and influenza vaccines.

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Drug Survival of JAK Inhibitors and Biologic DMARDs in Rheumatoid Arthritis Patients

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Ireland, Toronto); Elaine Soucy (Credit Valley Rheumatology, University of Toronto, Mississauga); Andrew Chow (Credit Valley Rheumatology, University of Toronto, Mississauga)
Objectives: To perform a local practice audit to assess the duration of drug survival amongst Rheumatoid Arthritis (RA) patients taking JAK-inhibitors and biologic DMARDs in a Canadian outpatient clinic.
Methods: Using the electronic medical records, patients prescribed a JAK inhibitor with a diagnosis of RA were included. Start and stop date, line of treatment and reasons for stopping were collected. The review included dates between July 2010 to August 2021. Median, mean, and range were calculated using a 95% confidence interval. The primary outcome is drug survival defined by days between start and stop date. If the drug was not discontinued, the stop date was noted as August 15, 2021. The drugs examined include: JAK-inhibitors (Tofacitinib, Baricitinib, Upadacitinib), anti-CD20 monoclonal antibodies (Rituximab), Interleukin-6 inhibitors (Tocilizumab, Sarilumab), TNF-alpha inhibitors (Infliximab, Etanercept, Adalimumab, Golimumab, Certolizumab), and T-cell (Abatacept).
Results: A total of 115 patients with RA were recruited on 12 different drugs. The drug survival durations are listed below from shorted to longest. Drug name n Median (days) Range Mean (days) CI interval Sarilumab 3 223.0 85, 2956 1088.0 -408.0, 2584.0 Certolizumab 6 292.0 120, 681 346.3 170.6, 522.0 Adalimumab 28 334.0 68, 4652 692.0 293.0, 1031.0
Abatacept 28 375.5 77, 4569 1007.4 563.0, 1451.8
Rituximab 14 443.0 1, 4327 757.1 207.4, 1306.8
Upadacitinib 31 443.5 25, 485 195.9 143.6, 248.2
Baricitinib 12 473.0 90, 797 471.0 322.9, 619.1
Tofacitinib 86 486.5 36, 2526 617.7 512.3, 722.4
Golimumab 28 487.0 147, 3586 689.4 437.5, 941.3
Infliximab 33 531.0 55, 3045 611.8 420.0, 803.6
Tocilizumab 29 546.0 77, 41248 2444.9 -302.7, 5192.5
Etanercept 38 663.0 29, 37589 2520.0 588.0, 4452.0
Conclusion: Drug survival for all drugs examined did not demonstrate any correlation between class of drug and duration contrary to the current literature. This study's population may be biased as most patients were failing multiple agents, for example JAK-inhibitors were mostly third-or fourth-line treatments, albeit drug survival did not decrease in duration. Comparing first-line JAK inhibitors and first-line biologics may demonstrate different lengths of drug survival as opposed to these results. To further this investigation, predictors of drug survival could be examined using disease activity and drug class switching using a larger sample size.

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Intra-Individual Change in Cognitive Function Among Adults with Systemic Lupus Erythematosus: A Longitudinal Markov Analysis

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Objectives: Cognitive impairment is prevalent among patients living with Systemic Lupus Erythematosus (SLE). Studies have focused on the prevalence of cognitive impairment in SLE cross-sectionally; however, there is little data examining SLE and cognition both longitudinally and at the intra-individual level. Our study aims to investigate how cognitive function changes in participants with SLE over time, and to understand what variables are associated with cognitive improvement or decline.
Methods: A total of 1281 participants with SLE from a single center were followed annually for seven years using telephone interviews. Cognition was measured annually using the Hopkins Verbal Learning Test-Revised (HVTL-R-verbal learning and memory) and the Controlled Oral Word Association Test (COWAT-verbal fluency). The Systemic Lupus Activity Questionnaire (SLAQ) and Center of Epidemiologic Studies Depression Scale (CESD) were used to assess disease severity and depression. A two-state Markov Analysis was used to model probabilities of transition between cognitive states: lower cognitive function [Z score < -1.5] and higher cognitive function [Z score ≥ -1.5] (Figure 1). Logistic regression analyses were used to examine the association between selected clinical variables and cognitive change.
Results: Most SLE patients demonstrated stability in cognition longitudinally. However, among those with change as assessed by the COWAT, individuals with SLE were 19 times more likely to improve in cognition than to experience cognitive decline. Using the COWAT, higher levels of depressive symptoms by CESD were associated with less likelihood of experiencing improvement in cognition (RR 0.98; 95% CI 0.96-0.99); and greater disease severity by SLAQ was associated with an increased risk of cognitive decline (RR 1.05; 95% CI 1.02-1.09). Using the HVLT-R, participants were 2.8 times as likely to improve in cognition than to experience cognitive decline. Increasing age (RR 1.02; 95% CI 1.01-1.03) and higher education level (RR 1.82; 1.28-2.58) were associated with a greater likelihood of improving cognition assessed by HVLT-R. Higher disease severity by SLAQ (RR 1.02; 95% CI 1.01-1.03) and depressive symptoms by CESD (RR 1.05; 95% CI 1.03-1.07) were associated with cognitive decline.
Conclusion: Most individuals with SLE experience stability in cognitive function over time. However, among those with SLE that do experience change in cognition, improvement in cognition was more common than decline. Increasing age and higher education levels were associated with a greater chance of cognitive improvement. Self-reported higher levels of SLE disease severity and depressive symptoms were barriers to experiencing cognitive improvement and were risk factors for experiencing cognitive decline in both assessments.

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"We Don't All Speak with One Voice": A Qualitative Study Exploring Perceptions of Including Patient Preferences in Clinical Trial Design

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of Calgary, Calgary)
Objectives: Researchers must make many decisions when designing clinical trials, and these decisions influence the evidence on treatments that is generated. Patients with rheumatic diseases can express preferences on various element of their care, including available treatments, and this information can be used to help design clinical trials. Our aim was to explore stakeholder perceptions of using preference elicitation methods to design clinical trials within rheumatology.
Methods: We conducted 60-minute semi-structured interviews with patients, and clinicians/researchers within rheumatology using the Zoom platform. We used a purposive + snowball sampling approach to recruit participants. Interviews were audio-recorded and transcribed using Zoom's auto-transcript feature. We used Braun and Clarke thematic analysis to analyze our data.
Results: We interviewed 17 patients, and 9 clinicians/researchers, until reaching data and inductive thematic saturation in both groups. From our analyses, we developed three themes related to including patient preferences in clinical trial design: Overall perceptions, Barriers, and Facilitators. Patients and clinicians/researchers generally shared the perception that patient preferences are important to consider. A key barrier identified was the additional work required to measure or incorporate preferences into trial design. A key facilitator was the movement towards patient engagement in research to encourage including patient preferences when designing trials.
Conclusion: Our findings allowed us to consider the potential applications of patient preferences to trial design according to stakeholders involved in the trial process. There may be a need to increase awareness and understanding on preference elicitation methods as an appropriate research strategy. Future research should be conducted to develop comprehensive guidance on how to include patient preferences when designing clinical trials in rheumatology.

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Retention and Tolerability of Mandated Biosimilar Switching for Etanercept and Infliximab at One Year: A Large Single-Centre Experience in British Columbia

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Objectives: In 2019, British Columbia Pharamcare mandated switching of all patients on Enbrel and Remicade for rheumatology indications to an approved biosimilar version. We aim to review the retention rates after one year in patients with rheumatic diseases who switched between biosimilar medications (etanercept or infliximab) due to mandated changes in BC Pharmacare coverage for patients with rheumatoid arthritis, psoriatic arthritis and ankylosing spondylitis.
Methods: We conducted a retrospective chart review of patients who switched from one biosimilar (Enbrel, Remicade) to another (Inflectra, Erelzi, Brenzys). Retention rates and associated adverse events (inefficacy or side effects) were reported. The team reviewed 76 patient charts from one outpatient rheumatology clinic. Patients with rheumatic disease (rheumatoid or inflammatory arthritis, ankylosing spondylitis, or psoriatic arthritis) who switched from etanercept or infliximab to a biosimilar due to changes in BC Pharmacare coverage in 2019 were included. Patients with no follow-up after the switch, patients who originally switched due to inefficacy or side effects of the original medication, patients who discontinued the original medication, and patients who declined switching due to private coverage were excluded.
Results: 78% of patients remained on a biosimilar after one year. The mean follow-up time was 10.1 months from when the switch was initiated. 22% of patients who switched to biosimilars did not remain on the new medication over the study duration. Of those, 11% switched back to

the originator and 11% switched to a biologic with a different mechanism of action because of inefficacy or side effects. There were no significant differences in the odds of retention based on medication (Inflectra, Erelzi, Brenzys) [JC1] or disease type (rheumatoid arthritis, psoriatic arthritis, or ankylosing spondylitis).
Conclusion: Overall, switching from Enbrel and Remicade to an approved biosimilar as mandated by BC Pharmacare for rheumatology indications was well tolerated in this review, with 78% of patients remaining on their biosimilar one year after the policy was implemented. There were no significant differences in the odds of retention based on medication or disease type between rheumatoid arthritis, psoriatic arthritis or ankylosing spondylitis.

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Adult-Onset Still's Disease: Points to Consider

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Objectives: Adult-onset Still's disease (AOSD) is a rare and complex autoinflammatory disease of unknown etiology. AOSD has varied presenting clinical features which can result in diagnostic uncertainty and prolonged time prior to treatment. NSAIDs, glucocorticoids, conventional DMARDs, and biologics are used in the management of AOSD with varying results. Furthermore, factors associated with de-escalation of therapies remain unclear. The purpose of this project is to review the literature and create a consensus on points to consider in the diagnosis, prognosis, and treatment of AOSD.
Methods: A scoping review of the AOSD literature over the last 15 years was performed. MEDLINE and EMBASE were searched and studies included if they provided information regarding the epidemiology, differential diagnosis, diagnostic criteria, complications, prognosis, and initial, chronic, and refractory treatment approaches in AOSD. Following narrative information synthesis, a meeting was held with 5 experienced clinicians across Canada for the creation of a consensus on points to consider in AOSD.
Results: The annual incidence and prevalence of AOSD is observed to be between 0.16 to 0.62 per 100,000 and 3.9 to 6.9 per 100,000, respectively. AOSD most commonly affects young adults and women. Women are more likely to have severe complications from AOSD including macrophage activation syndrome, disseminated intravascular coagulation, or thrombotic thrombocytopenic purpura. The Yamaguchi criteria remains the most widely used diagnostic tool with a sensitivity of 96.2% and specificity of 92.1%. Common presentation manifestations include intermittent high fevers (>39.0 degrees Celsius), arthralgias/arthritis, pharyngitis, lymphadenopathy, and a maculopapular rash. Other manifestations can variably involve the cardiovascular, respiratory, and GI systems. Common laboratory abnormalities include leukocytosis with neutrophilia, elevated ESR and CRP, elevated ferritin, and transaminitis. AOSD patients are most commonly ANA and Rf negative. Initial treatment includes NSAIDs, glucocorticoids, and conventional DMARDs. Disease refractory to initial therapy is managed through IL-1 and IL-6 inhibitors such as Anakinra or Tocilizumab. Elevated ESR, pericarditis, and non-response to corticosteroids are some of the factors associated with refractory and chronic disease requiring advanced therapies and long-term follow-up
Conclusion: AOSD is a rare and multi-faceted autoinflammatory disease with a diverse presentation profile. Clinicians are recommended to consider AOSD, following exclusion of infections, malignancies, and autoimmune diseases, as a cause for fever of unknown etiology. Herein we provide points to consider in the diagnosis and management of AOSD following expert consensus.

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Transition Readiness Among Patients Transferring From Pediatric to Adult Rheumatology: Expectations and Goal-setting

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Objectives: Transition programs for adolescents with JIA and jSLE are designed to increase patients' healthcare self-management skills to enable a successful transition to adult care. Quantifying improvements in self-management skills is essential to understanding the effectiveness of transition programs. Identifying patient characteristics associated with lower/higher levels of transition readiness is necessary to address individual needs. At the McMaster Children's Hospital Rheumatology Transition Clinic, JIA and jSLE patients work alongside a multidisciplinary team to enhance self-management skills through goal setting. The objectives of this study were to (1) measure changes in transition readiness over time in adolescents with JIA and jSLE and (2) determine the potential impact of sex and age on these changes.

Methods: The TRANSITION-Q is a 14-item validated self-administered questionnaire used to determine healthcare self-management skills. Adolescents (age 14-18) with JIA and jSLE are seen by an adult and pediatric rheumatologist in our multidisciplinary transition clinic. Participants complete the TRANSITION-Q at the time of consent (baseline) and at each follow-up visit scheduled at the discretion of the treating physician. The adolescent then reviews their responses and, with the support of a Child Life Specialist, establishes goals to improve self-management skills. TRANSITION-Q scores were determined for the entire study population and then separately by sex and age group. Regression analyses determined if baseline or changes in TRANSITION-Q scores were different by sex and age group.

Results: A total of 61 adolescents participated in the study; female (n=41), JIA (n=52), mean(SD) age 16.2(1.2) years and mean(SD) age at diagnosis of 12.2(4.2) years. The group mean(SD) TRANSITION-Q score at baseline was 57.2(14.5). Mean baseline TRANSITION-Q scores were not significantly different in females compared to age-matched males. There was considerable variability in baseline scores within each age group (Figure 1a). The majority of TRANSITION-Q scores increased from baseline (n=42, 69%), although 9 participants had decreased scores (16%). There were no sex-differences in the amount of improvement over time. Age was not related to the amount of change in TRANSITION-Q scores over time (Figure 1b).

Conclusion: Baseline Transition-Q scores did not differ significantly between sexes and there was high variability among age-matched males and females; thus, providers should not have predetermined expectations of transition readiness based on age or gender. Despite variability in transition preparedness at baseline, scores generally improved with goal setting. Therefore, goal setting may be used to successfully increase transition readiness over time, regardless of differences in age, sex or transition preparedness at baseline.

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Impact of the COVID-19 Pandemic on Juvenile Idiopathic Arthritis Presentation and Research Recruitment: Results from the CAPRI Registry

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Objectives: The COVID-19 pandemic has disrupted healthcare and clinical research worldwide. Timely diagnosis and initiation of therapy is critical to improving long-term outcomes and preventing irreversible joint damage in patients with JIA. The diagnosis hinges on timely referral and joint examination, both difficult to accommodate when the pandemic forced many medical encounters to occur virtually. Several reports have shown an impact on rheumatology care. Higher rates of JIA disease flares presenting to hospitals during the pandemic have been reported, perhaps due to delayed follow-up intervals. The aim of this study was to characterize COVID-related disruptions in initial presentation of JIA to pediatric rheumatology care and research recruitment in Canada. We hypothesize that disruption of care would result in prolongation of time from symptom onset to first assessment and a greater severity at presentation, while research disruption would be reflected by a drop in Registry recruitment.

Methods: Data was obtained from the Canadian Alliance of Pediatric Rheumatology Investigators (CAPRI) National Registry, which started in 2017 and enrolls children with JIA within 3-months of diagnosis, following them at every clinic visit. The Registry prospectively collects and shares data on disease course, outcomes, and adverse events. Data from the year pre-pandemic (March 11, 2019-March 10, 2020) was compared to data collected during the first year of the pandemic (March 11, 2020-March 10, 2021). Outcomes included time from symptom onset to first assessment, disease severity at presentation and registry recruitment. Proportions and medians were used to describe categorical and continuous variables, respectively.

Results: The median time from symptom onset to first assessment was 138 days pre-pandemic versus 146 days during the pandemic. JIA category frequencies remained stable, predominantly oligoarticular JIA (44% pre-pandemic, 46.8% pandemic), except for systemic JIA (12 cases pre-pandemic, 1 pandemic). Clinical features, disease activity (cJADAS10), disability (CHAQ) and quality of life (JAQQ) scores were similar between the two cohorts. Pre-pandemic, 225 patients were enrolled, compared to 111 in the pandemic year, with the greatest decrease from March to June 2020.

Conclusion: We did not observe the hypothesized delay in presentation or increased severity at presentation. This suggests that within Canada, pediatric rheumatology care adapted well to

provide ongoing support and care to new patient consults. Research disruption was associated with a 50% enrollment decrease in the pandemic year, most significantly from March to June 2020. It has since improved, consistent with a limit in non-essential research staff presence in hospitals early on. Best Abstract on Clinical or Epidemiology Research by a Trainee - Phil Rosen Award.

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Evaluation of Methotrexate Intolerance in Children with Morphea

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Objectives: Methotrexate is an immunosuppressant used to treat a variety of diseases. The prevalence of intolerance using the Methotrexate Intolerance Severity Score (MISS) in children with Juvenile Idiopathic arthritis (JIA) ranges from 25-75%, and intolerance in this population is associated with higher doses and younger ages.1-4 We observed a high frequency in the rates of intolerance to MTX among patients treated for morphea and other inflammatory skin disorders (eczema, psoriasis, alopecia areata). Objectives were to determine the prevalence and predictors of methotrexate intolerance in children with morphea compared to children with inflammatory skin diseases and JIA/uveitis.

Methods: Patients aged 2-18 years taking methotrexate for a minimum of 3 months to treat morphea, inflammatory skin disease, or uveitis/JIA were recruited. Methotrexate intolerance was calculated using MISS, a questionnaire validated in children with JIA. 2 Participants completed 16 questions across 4 domains (abdominal pain, nausea, vomiting, and behavioral symptoms). Each item was ranked 0 to 3, with a total possible score of 36. Intolerance was defined by a score of 6 or higher. A one-way ANOVA compared absolute intolerance scores.

Results: Of 48 participants (mean (SD) age 11.3 (+/-4.1) years, 70.8% female) 15 had morphea, 16 had JIA/uveitis, and 17 had inflammatory skin disease (Table 1). The overall mean MISS score was 4.1 (SD +/-5.2). Age, sex, duration, and dose did not correlate with overall MISS. MISS mean total for oral dosing was 2.5 (SD +/-3.4) with a range of 0-13, compared to a mean total MISS of 6.78 (SD = +/-6.8) for sub cutaneous dosing. JIA/uveitis patients had the highest mean total MISS 6.3 (SD +/- 7.1) followed by morphea patients 3.7 (SD +/-4.0), and inflammatory skin disease patients 2.2 (SD +/-2.8). The route of administration significantly correlated with MISS gastointestinal and behavioural scores (p=0.01). The odds ratio of intolerance according to route of administration was 11.2 (95% CI 2.03-61.89).

Conclusion: Methotrexate intolerance was highest among JIA/uveitis patients. The only predictor for risk of intolerance was subcutaneous route of administration. Future work could examine methotrexate intolerance and disease activity over time, and interventions designed to minimize intolerance.

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Prevalence and Titre Distribution of Antinuclear Antibodies in Juvenile Idiopathic Arthritis – A Systematic Review

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Hospital/University of Calgary, Calgary); May Choi (University of Calgary, Calgary); Marvin Fritzler (University of Calgary, Calgary)
Objectives: Antinuclear Antibodies (ANA) are detected in almost all subtypes of Juvenile Idiopathic Arthritis (JIA), however, traditionally are a marker of uveitis risk. Although common in JIA, ANA, detected by the HEp-2 immunofluorescence assays (IFA), lack specificity and can be present in healthy children at low titres. There is no international consensus as to what serum dilution should be used for JIA ANA IFA testing. This systematic review determined the distribution of ANA titres in JIA with the primary aim of finding the serum screening dilution that should be used when considering a diagnosis of JIA.
Methods: On February 17th, 2021, five databases (EMBASE, Medline, PubMed, SCOPUS and Cochrane Reviews) were searched, identifying 1506 abstracts of which 192 were duplicates and 1197 did not meet inclusion criteria, leaving 108 full texts to be reviewed. Studies were excluded if ANA titres were not reported, data was collected prior to 2000, populations included adult patients, were not in English, or did not use an indirect immunofluorescence assay (IFA). Eight full texts were unobtained, and 82 were excluded, with 46 being excluded because ANA titres were not reported. Data extraction was done on the remaining 26 full texts.
Results: 6022 patients were identified; 5569 had JIA, 273 were controls. Of all seven JIA subtypes, Persistent Oligoarthritis was the most common (33.3%) and had the highest frequency of ANA positivity (46.9%). The most reported ANA screening titer was 1:80, [732/1935 (37.8%)]. An ANA titre of 1:80 also had the highest proportion of JIA patients who ANA's exceeded the reference range for each individual study [35.1% (95%CI =33.7-36.4%)]. Seventeen studies (58%) included patients with uveitis. Of those reported, 120/168 (71%) JIA-uveitis patients were ANA positive. The sensitivity and specificity of ANA in JIA-uveitis were 71.4% (95%CI = 64.3%-78.6%) and 70.1% (95%CI = 67.9%-72.3%). Specific ANA titres were not reported in relation to the uveitis subset.
Conclusion: Our results revealed a large variation of ANA IFA serum dilutions used in the context of JIA, with the common being 1:80. Unfortunately, the current literature is disappointing and lacks comparison of ANA titres between JIA and healthy controls. Additional studies are needed to address the paucity of data to inform the ANA IFA screening dilutions of importance in JIA and how ANA titres can be used to determine the risk of developing uveitis.

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Comparative Evaluation of Juvenile-onset Systemic Sclerosis and Adult-onset Systemic Sclerosis

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Objectives: To comparatively evaluate the clinical manifestations, autoantibodies, comorbidities and survival in patients with juvenile-onset systemic sclerosis (jSSc) and adult-onset systemic sclerosis (SSc).
Methods: We conducted a retrospective cohort study of adults and children (≤16 years old) from

the Toronto Scleroderma Program who fulfilled the American College of Rheumatology/European League Against Rheumatism classification criteria for SSc. Clinical manifestations, autoantibodies, co-morbidities and survival were compared between jSSc and SSc patients. The primary outcome was the time from diagnosis to death from all causes. Survival probabilities were determined through Kaplan-Meier survival curves. A multivariable cox proportional hazards regression model was performed to evaluate the hazard ratio (HR) in all-cause mortality.
Results: We included 1,955 patients [jSSc n=64 (3.3%) and SSc n=1891 (96.7%)]. Throughout the disease course, when compared to SSc, jSSc patients more frequently had calcinosis [46.9% versus 22.6%, relative risk (RR) 2.01 (95%CI 1.53, 2.65)], digital ulcers [45.3% versus 33.1%, RR 1.34 (95%CI 1.02, 1.77)], and scl-70 antibodies [28.1% versus 18.7%, RR 1.28 (95%CI: 0.87, 1.88)]. jSSc patients less frequently had telangiectasia [51.6% versus 66.8%, RR 0.75 (95%CI 0.59, 0.95)], pulmonary hypertension [9.4% versus 25.6%, RR 0.33 (95%CI 0.15, 0.70)], and anti-centromere antibodies [9.4% versus 22.5%, RR 0.38 (95%CI 0.18, 0.81)]. The were no differences in the frequency of interstitial lung disease (35.9% versus 35.1%) or renal crisis (3.1% versus 6.8%). jSSc patients had fewer comorbidities including coronary artery disease [RR 0.18 (95%CI 0.03, 1.28)] and hypertension [RR 0.20 (95% CI 0.07, 0.61)]. None of the jSSc patients developed cancer, peripheral vascular diseases, atrial fibrillation or stroke. Thirteen (26.3%) jSSc patients and 586 (31.0%) SSc patients died. jSSc patient had better survival than SSc patients (log-rank p=0.0002; Figure 1). SSc patients had an adjusted HR of 2.1 (95%CI 1.2, 3.7, p=0.01) for all-cause mortality compared to jSSc patients.
Conclusion: jSSc patients have more frequent cutaneous manifestations but not more frequent internal organ manifestations compared to adult SSc. Long-term survival appears to be more favorable in jSSc patients.

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Predictors of Health-Related Quality of Life in Rheumatoid Arthritis Patients

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Objectives: Health-related quality of life (HRQoL) is lower in rheumatoid arthritis (RA) patients compared to the general population, yet a comprehensive study evaluating predictors and the relative contribution of sociodemographic, RA-related, comorbidities, and lifestyle factors is lacking. Our study's objectives were to identify factors that predict 1) HRQoL one year after baseline assessment; and 2) change in HRQoL over 12 months.
Methods: Survey data from a longitudinal quality of care study of RA patients recruited from a population-based cohort identified using administrative data were analyzed. Participants who completed questionnaires in 2015 and 2016 assessing sociodemographic, health status (RA-related and comorbidities), and lifestyle factors were included. HRQoL was measured using EQ5D-VAS. Three model selection procedures for multivariable linear regression models – stepwise selection (p-entry<0.05; p-exit≥0.15), all-possible selection, and LASSO method – were used to select important HRQoL predictors. Models were compared using cross-validation (CV) and the model with smallest CV error was selected. Model selections without and with 2015 EQ5D-VAS were conducted to determine best models for absolute value, and change in HRQoL, respectively. We used sum of R2 values to assess the variance explained by each model and to

determine the relative contributions of sociodemographic, RA-related, comorbidities, and lifestyle factors. Data analyses were conducted using RStudio 1.3.1093.
Results: Our sample included 168 individuals with RA (72% women, mean age 70.7 ± 10.6 years, mean disease duration 24.3 ± 11.9 years). EQ5D-VAS in 2016 was 67.5/100 ± 19.4. The model controlling for baseline 2015 HRQoL had lower AIC and better predictive ability (R2) for 2016 HRQoL. HRQoL in the previous year contributed most to predicting HRQoL. Of the RA-related factors, only disease activity and physical function were significant predictors. Both variables were highly correlated (r=0.69) and likely capture similar disease effects. Of the comorbidities, only depression predicted HRQoL, and it contributed greater to HRQoL than RA-related factors. Lifestyle and sociodemographic factors evaluated contributed little to HRQoL. Significant predictors and variance explained by model with 2015 HRQoL is presented in Table 1. Our study limitations include potential respondent bias and a predominantly White and older sample with longstanding disease. Our findings may not be generalizable to samples with different characteristics.
Conclusion: HRQoL in our RA sample was multifactorial. Predictors from different domains contributed to HRQoL. HRQoL in the previous year contributed most to predicting future HRQoL. Depression was the second most important predictor. Early identification and management of depression may improve overall HRQoL in RA patients.

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Co-management of Rheumatoid Arthritis Patients with Cardiology Correlates with Fewer Cardiac Events

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Objectives: Rheumatoid Arthritis (RA) is a systemic autoimmune disease with important cardiovascular implications. Cardiovascular disease represents over half of RA deaths and is a causative factor of significant morbidity. Although traditional cardiovascular risk factors play a role in the development of cardiovascular disease, the rheumatoid patient faces additional components of atherosclerotic plaque formation attributed to agents of chronic inflammation. It is therefore imperative to identify ways to optimize detection and management of RA patients with coronary artery disease (CAD). In this retrospective study we evaluated whether RA patients followed by a cardiologist have fewer cardiac events and hospitalizations compared to patients followed by rheumatology without cardiology co-management.
Methods: This is a retrospective study of patients diagnosed with RA and CAD. Patients were identified and filtered via EPIC Database search engine. Parameters were set from January 1, 2014, to June 1, 2020. Inclusive criteria consisted of patients with ICD 10 criteria for both RA and CAD, and those with at least one Cardiology and Rheumatology office visit. A total of 139 patients met criteria. Characteristics were described using descriptive statistics. Chi-square test, Wilcoxon signed rank sum test, and Cochran-Armitage test tested for associations and trends.
Results: Of the 139 identified patients, there were 100 females (72%) and 39 males (28%) with a

mean age of 72 (range: 26 – 98). Data was divided into three groups based on duration of RA: 40 patients with RA duration < 5 years (29%), 51 patients with RA duration > 5 but < 10 years (37%), and 48 patients with RA duration > 10 years (35%). Most patients (70%) had at least one cardiac-related hospitalization prior to establishing care with cardiology (average: 1.3 range: 0 - 8). Once established, 73% of patients did not have any further cardiac-related hospitalizations. However, only 22% of them did not have any non-cardiovascular hospitalizations. This association was significantly different ($p < 0.0001$). Despite this, patients with regular cardiology follow-up did not demonstrate statistically significant increases in adverse events Table 1. Data was stratified by length of RA. The difference in cardiovascular hospitalizations was not significantly different among the three groups ($p > 0.05$).

Conclusion: Our study revealed that patients followed by both Rheumatology and Cardiology have fewer cardiac-related hospitalizations, fewer adverse cardiac events, and improved survival. It is important to optimize management of RA patients to help decrease the rates of cardiac morbidity and mortality – with co-management representing a cornerstone of care.

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Multimorbidity Patterns and Associations with Disability Differ in Men and Women in the First Year following RA diagnosis: Results from the Canadian Early Arthritis Cohort (CATCH)

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Objectives: Chronic disease multimorbidity (MM) is prevalent in RA. MM can vary in complexity and different combinations of chronic conditions may have different physical and psychological impacts on patients. The objective of the present study was to identify the most prevalent MM patterns in women and men around RA diagnosis and estimate their associations with disability over the first year of follow up, in a large real-world incident RA cohort.

Methods: Data were from early RA patients (<1-year of symptoms) diagnosed and treated in rheumatology clinics across Canada that enrolled in CATCH from Jan 2007 through March 2020. Participants completed the Rheumatic Disease Comorbidity Index (RDCI) at baseline and repeat assessments of disease activity (DAS28) and disability (MHAQ) every 3- months over 1 year follow up. We identified the top 10 most prevalent MM patterns by sex by first coding the presence/ absence of each condition and then ranking the prevalence of all possible reported combinations. We estimated sex-stratified longitudinal associations between prevalent MM patterns and repeated measures of disability in the first year follow up with generalized estimating equations (GEE), adjusted for age, education, symptom duration, smoking, obesity and time-varying measures of DAS28 disease activity.

Results: The sample included 2,576 ERA patients, 1843 (72%) were female, with a mean(sd) age of 56 (15) years and 6 (3) months of symptoms. At baseline, 95% were treated with csDMARDs (mostly methotrexate (74%)) and 2% with a biologic. More than half of patients (54%) reported >=1 MM. Prevalence, patterns and complexity of MM differed by sex. HTN, lung disease and depression were the most prevalent MM patterns reported in women, and HTN,

CVD, and CVD+HTN were the most prevalent patterns in men (Figure). More complex MM patterns involving multiple conditions were more prevalent in men (26%) than in women (12%) (Figure). In fully adjusted multivariable GEE models, depression (beta: 0.14, 95% CI: 0.04, 0.24) in women, and lung disease + HTN (beta: 0.22, 95% CI: 0.03, 0.42) in men, were significantly associated with higher disability over time.
Conclusion: Results from this large real-world incident cohort study suggest that multimorbidity is common around the time of RA diagnosis and differs between men and women. Results suggest potential shared risk factors and pathways between identified MM patterns and highlight the need to screen for and treat MM conditions, particularly those which increase disability.

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The Impact of Comorbidities on the Simple Disease Activity Index (SDAI) and its Components Over the First Year of Follow-up – An Analysis from the Canadian Early Arthritis Cohort (CATCH)

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Objectives: Comorbid conditions have been shown to negatively influence the achievement of treatment targets in rheumatoid arthritis (RA) patients. The objective is to look at the relationships between comorbidities and components of common clinical disease activity scores, such as tender (TJC) and swollen (SJC) joint count, patient global assessment (PtGA), physician global assessment (MDGA), C-reactive protein (CRP) and pain in early RA.
Methods: Using the Rheumatic Disease Comorbidity Index (RDCI), the influence of comorbidities on each component's trajectory in time has been assessed in early RA (ERA) patients over the first year of treatment with conventional synthetic DMARDS using data from the Canadian Early Arthritis Cohort (CATCH). The adjusted effects of RDCI scores (0, 1, 2, and ≥ 3) on the trajectory of the SDAI, on each component of the SDAI, and on pain was evaluated over the first year of follow-up with generalized estimating equations (GEE). Data were adjusted for confounders.
Results: This sample size included 2248 ERA patients with a mean symptom duration (SD) of 5.71 (2.96) months; mean age (SD) was 55 (15) years old and 72% were female. At baseline, 1664 (74%) were treated with methotrexate with a mean weekly dose (SD) of 20.0 mg (4.2) and 1340 (60%) also received other conventional synthetic DMARDs. The mean (SD) SDAI at enrolment was 29 (15) and 90% were classified as having moderate-high SDAI. RDCI scores of 0, 1, 2 or ^{3}3 were obtained in 888 (40%), 547 (24%), 451 (20%), and 362 (16%) participants, respectively. Although disease activity did not differ by comorbidity status at baseline, patients with RDCI of 0 had better improvement (rate of change) in SDAI (Figure 1a), PtGA, MDGA and pain (Figure 1b,c,d) over time relative to patients with multiple RDCI conditions ($p<0.05$). A significant higher rate of change in SJC was observed in patients with RDCI of 1 and 2 compared with participants having RDCI score of 3 or higher ($p= 0.01$) (Figure 1e). The RDCI

scores were not significantly associated with the change of TJC and CRP (Figure 1f and g) over one year.
Conclusion: In this ERA cohort, having multiple comorbidities was associated with worse improvement and disease activity assessed by SDAI. SJC, PtGA, and MDGA were the components of SDAI that were most influenced by the presence of comorbidities. The results demonstrate a negative effect of having comorbidities at disease onset of RA on the evolution of both patients and physicians reported outcomes.

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Formulation of an Interdisciplinary Care Pathway for Early Rheumatoid Arthritis

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Objectives: A care pathway is a guide for the mutual decision-making and organization of care processes for a well-defined group of patients. It facilitates communication and care coordination among multidisciplinary team members, patients, and families. Our goal is to develop an interdisciplinary care pathway for patients with early rheumatoid arthritis (RA), including protocols for referral triage, diagnosis, and management, using input from members of our division.
Methods: The care pathway was developed in four main phases. In Phase 1, an anonymous survey consisting of 57 questions was electronically distributed to division rheumatologists. This provided data to a small interprofessional working group of rheumatology team members who drafted an initial care pathway informed by evidence-based practice in Phase 2. In Phase 3, an education day was held with approximately 40 physicians (including practicing rheumatologists and rheumatology residents), members of our interprofessional team (nursing, social work, physiotherapists, and pharmacists), and two clinic managers, to review the proposed care elements through presentations and small group discussions. The care pathway was revised for content and implementation considerations based on feedback received. The care pathway was summarized in a 20-page document outlining our team approach to early RA care. An accompanying 14-page document was also developed to support nurses in answering telephone calls from patients on common issues. Phase 4 consists of ongoing implementation efforts and evaluation of the care pathway across multiple practice sites.
Results: Our care pathway promotes an approach to patient-centered early RA care using an interdisciplinary approach. Care pathway elements include early workup, pre-treatment screening and vaccinations, choice of initial DMARDs, and use of steroids using shared decision-making strategies. Our triage system for stratifying the urgency of referrals for early inflammatory arthritis, as well as protocols for our nursing case manager roles, are also highlighted in this document, along with our interdisciplinary team roles to support optimal patient care. Pathway implementation has been facilitated by nursing protocols and evaluation, including continuous monitoring of key indicators.
Conclusion: The ‘Calgary Early RA Care Pathway’ emphasizes a patient-centered and

interdisciplinary approach to early RA identification and treatment. Implementation and evaluation of this care pathway is ongoing to support optimal care for patients. Supported by a CIORA grant.

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Do Risk-Taking Behaviours Predict COVID-19 Vaccine Acceptance in People With Rheumatic Disease?

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Objectives: Several factors associate with vaccine acceptance. It is unknown if risk-taking behaviours among rheumatic disease (RD) patients are linked to COVID-19 vaccine acceptance.

Methods: Between November-December 2020 (before COVID-19 vaccine roll-out in Canada), a cross-sectional survey was completed by RD patients presenting for influenza immunization to a university-affiliated hospital network. Demographics, RD diagnosis, treatment, and the likelihood to receive a future COVID-19 vaccine were assessed. We used the DOSPERT health and safety subscale and the medical risk domain add-on to evaluate the likelihood of engaging in risk behaviors (e.g., heavy alcohol use) and medical risk attitudes. A risk-taking score was calculated based on the sum of the scores of each question, transformed to a 0-100 scale (%) and converted to a three-level categorical variable (low, moderate, high) by tertiles. According to the likelihood to receive a future COVID-19 vaccine, patients were classified as significantly hesitant (scores 0-7.4), mildly hesitant (scores 7.5-9.9), or non-hesitant (score 10).

Results: One hundred and eighty-seven RD patients completed the survey. Participants had a mean age of 55.1 ± 17.9, and most were females (n=134, 71.7%) and living with rheumatoid arthritis (n=90, 48.1%) or systemic lupus erythematous/vasculitis (n=51, 27.3%). Most patients were non-hesitant to receive a future COVID-19 vaccine (n=103, 55.1%), while a quarter were significantly hesitant (n=52, 27.8%). Significantly hesitant individuals were less likely to engage in ‘drinking heavily at a social function’ (significantly hesitant: 7.7% vs. non-hesitant: 21.4%; OR=0.3, 95% CI: 0.1-0.9), while those mildly hesitant towards vaccination tended to be more likely to ‘sunbathe without sunscreen’ (mildly hesitant 25% vs. non-hesitant: 12.6%; OR=2.3, 95% CI: 0.9-6.2). Upon adjusting for age, sex, language, low-risk-taking RD patients were more likely to be hesitant to receive a future COVID-19 vaccine as compared to moderate/high-risk patients (OR: 1.9; 95%CI: 1.01-3.55).

Conclusion: COVID-19 vaccine hesitant RD patients are less likely to engage in risk-taking. Future research could focus on whether promotion of vaccine safety might increase vaccine uptake in this group.

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Is Chronic Fatigue Syndrome (CFS) Related to Disease Activity in ANCA-associated Vasculitis?

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Objectives: Fatigue is a major burden of disease in patients with ANCA-Associated Vasculitis (AAV) and results in a decreased quality of life. The incidence of chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME) in AAV patients is, however, unknown. The aim of our study is to evaluate the presence of chronic fatigue in patients with a diagnosis of AAV i.e., granulomatosis with polyangiitis, eosinophilic granulomatosis with polyangiitis or microscopic polyangiitis, and to identify potential clinical and biopsychosocial determinants and compare them to healthy volunteers (HC).
Methods: 64 AAV and 20 HC participants were included in our study completed the validated DePaul Symptom Questionnaire (DSQ). Patients were labelled with CFS/ME when they fulfilled the Canadian Consensus Criteria. For assessing health-related quality of life in patients, we used The Short Form (36) Health Survey. Disease activity was scored using Birmingham Vasculitis Activity (BVAS), whereas the Vasculitis damage index (VDI) was used to evaluate damage. Mental comorbidities where analyzed to understand potential biopsychosocial factors related to chronic fatigue. To assess anxiety and depression we used the Hospital Anxiety and Depression scale (HADS). We also used the Cognitive Failure Questionnaire (CFQ) to estimate the frequency of cognitive failure. Sleep quality was assessed using The Pittsburgh Sleep Quality Index (PSQI). In addition, Fibromyalgia questionnaire was used to assess wide spread pain. Statistical analysis was carried out using Fischer's exact test.
Results: We found that 32/64 (50%) of AAV patients fulfilled the case definition for CFS/ME. There was no relationship between the presence of AAV patients with CFS/ME compared to AAV patients without CFS/ME with BVAS (p=0.65), VDI (p=1), or C-reactive protein (p= 0.07) in our study population. However, a considerable and statistically significant correlation was present in patients with AAV suffering from CFS/ME with anxiety (p= 0.0095), depression (p= 0.0001), cognitive failure (p= 0.0002), fibromyalgia (p= 0.0031), sleep disorder (p= 0.0007). Also we found a substantial reduction in a role physical functioning (p= 0.0001), vitality (p= 0.0001), and social functioning (p= 0.0001) were extremely apparent in AAV patients with ME/CFS (compared to AAV patients without ME/CFS or HC).
Conclusion: Chronic fatigue affects AAV patient's mental wellbeing. From our analysis we conclude that chronic fatigue, cognitive failure, anxiety/depression, sleep and pain, co-occur independently of vasculitis disease activity. We postulate that adjunct therapies aimed at improving these symptoms should be utilized for patients with AAV suffering from fatigue.
Funding: Dutch Kidney Foundation (17PhD01) Arthritis Society (19-0558)

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A PRAgmatic Study of Vitamin D Status in ANCA-associated Vasculitis (PRAVDA): Protocol from the Toronto Vasculitis Clinic

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Background: Vitamin D may participate in the pathogeny of several immune-mediated diseases. It may have a significant role in initiation, progression and/or severity of antineutrophil cytoplasm antibody (ANCA)-associated vasculitis (AAV), though data are limited.
Objective: To conduct a pragmatic study to assess associations of vitamin D status, followed by vitamin D supplementation as indicated, to disease manifestations, activity and/or relapse in a local cohort of patients with AAV.

Methods/ Design: PRAVDA is a 12-month exploratory, prospective, pragmatic trial assessing 25-hydroxy-vitamin D_3 (25[OH]D_3) status at baseline in patients with AAV, followed by an adjustment in vitamin D_3 dose supplementation as indicated based on baseline level. One hundred consecutive patients with AAV followed in the Toronto Vasculitis Clinic at Mount Sinai Hospital, Ontario, Canada will be enrolled. Vitamin D status will be measured at baseline (+/- 3-4 weeks of enrollment), followed by repeat measurement at 12-months (+/- 2 months). Patients with insufficient (<75 nmol/L) and/or deficient vitamin D status (<50 nmol/L) at entry visit will be informed and counselled to increase their vitamin D_3 supplementation by 1,000 IU/day (to a maximum of 2,000 IU/day; patients reportedly taking 2,000 IU/day of vitamin D will only be encouraged to take it regularly, without being asked to increase their dosage). The primary outcome is disease outcome (activity and relapse) at 12 months. Should disease relapse occur during the study period, it will be encouraged for the physician to measure 25(OH)D_3 at the time of relapse. The secondary outcomes will assess for associations of vitamin D status (baseline and/or 12-months) with specific disease manifestations (eg. lung fibrosis and renal function).
Conclusion: This is the first prospective study to assess correlations between vitamin D status and AAV manifestations / outcomes following a pragmatic vitamin D_3 dose adjustment in AAV. This study will inform providers about the utility of implementing routine vitamin D status measurements in patients with AAV, and whether stringent vitamin D supplementation should be further assessed with a larger randomized controlled trial.

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Observational Cohort Study of an Online Musculoskeletal Ultrasound Course

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Objectives: The Canadian Rheumatology Ultrasound Society (CRUS) has delivered a point-of-care musculoskeletal ultrasound (MSK US) course annually since 2010, normally held in-person over two weekends. The COVID-19 pandemic has required that the course be delivered completely online. We aimed to determine the impact of this change by comparing the homework adherence, and acquisition of MSK US knowledge and skills in the new online cohort versus a historical in-person cohort. We hypothesized that learning online is as efficacious as in-person learning.
Methods: Participants attended two weekends (October and March), in-person (2018-2019 cohort) or on-line (2020-2021 cohort). All were asked to submit US images every 2 weeks for 3 to 5 months after each weekend, for which they received written feedback from expert faculty. As a part of the on-line instructional approach, participants also had the opportunity to meet one-on-one on zoom with assigned mentors. We compared the percentage of participants who submitted any US homework images, and the overall homework completion rate. Two independent, blinded reviewers scored a sample of submitted US images using published criteria.
Results: For the 2018-2019 cohort, 63% (17/27 students) submitted US homework, and had an average homework completion rate of 39%. Few (5, 19%) completed all their homework batches, and 56% (15) completed one or none. For the 2020-2021 online cohort, 71% (17/24 students) submitted US homework, and had an average homework completion rate of 48%. Few (4, 17%) completed all their homework batches, and 29% (7) completed one or none. Post-course evaluation forms revealed high satisfaction scores that were similar in both groups. Scores

reflecting US skills have been collected and final results comparing the two groups will be presented.
Conclusion: Students were overall satisfied with the online course. The two cohorts had similar rates of participation, though the online cohort did complete a greater percentage of their US homework. We expect few difference in their acquired MSK US skills, which may influence course planners as they consider a return to in-person teaching beyond the pandemic.

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Mindfulness-Based Stress Reduction (MBSR) in Rheumatoid Arthritis (RA) Patients: A Patient-Related Outcomes (PRO)-Oriented Pilot Trial

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Objectives: In a pragmatic pilot study, group sessions of Mindfulness-Based Stress Reduction (MBSR), an eight-week non-pharmacological approach, were offered to patients with clinically controlled RA but elevated negative Patient-Related Outcomes (PROs) and/or elevated Patient Global Disease Activity (PGA) scores.
Methods: During each 4-week period preceding the start of 4 successive MBSR groups held between November 2017 and June 2019, patients reported in clinical remission on stable treatment at last visit were reassessed at their regular follow up, and referred to research assistants if still clinically controlled and interested. Inclusion criteria were either elevated (≥16) Center for Epidemiologic Studies Depression (CES-D) score or a difference ≥2/10 (Delta) between PGA and Physician General Assessment (EGA). Questionnaires on depression (CES-D and BDI), anxiety (GAD-7), sleep quality, function (M-HAQ), coping strategies (CHIP), mindfulness (FMMQ), and Simple Disease Activity index (SDAI) were evaluated at baseline and 6 and 12 months after the intervention. Scores were compared between baseline and 6 and 12 months. Differences were assessed with linear mixed regression models. p values were adjusted for multiple comparisons. Eleven participants were interviewed about their experience after the 6-month assessment using a semi-structured interview guide.
Results: Out of 306 tagged patients, 241 were not offered MBSR: 168 (69.7%) not eligible, 55 (22.8%) declined, 18 (7.5%) other reason. Of the 65 proposed MBSR, 39 (60%) consented, 31 took part to at least 1 meeting, and 28 (43%) completed both the baseline and the 6- and/or 12-month evaluation. Timing, site and frequency of the meetings, extremes of age and comorbidities were reported as barriers to participation. Results showed significant and progressive improvements from baseline to 12 months post-MBSR for depression, anxiety, emotional coping, sleep quality, mindfulness and function (Figure). PGA, Pain and SDAI did not change significantly. Emotional coping was the only strategy significantly modified by MBSR. Qualitative interviews at 6 months in 10 patients indicated persistent subjective patient benefits including integration of MBSR techniques and effective coping strategies into daily life.
Conclusion: Hurdles to offering MBSR to controlled RA patients with high negative PROs are numerous. Nonetheless, MBSR had lasting benefits on outcomes that are important to patients, particularly anxiety, depression, sleep, and function. MBSR enabled patients to use fewer emotional coping strategies, a maladaptive approach to illness critical to quality of life. MBSR

did not appear to improve PGA or pain and did not increase SDAI remission. The reasons for the apparent PGA / other PROs require further studies. Supported by a CIORA grant.

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Assessment of Adult Rheumatologists' Knowledge, Comfort Level, and Perceived Barriers in Supporting Youth with Chronic Rheumatic Diseases in Canada

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Objectives: Transitioning from pediatric to adult rheumatology care around age 18 is an important and often stressful period in patients' lives. Factors influencing transition include increasing autonomy over one's care, increased morbidity, hospital and administrative policy changes, and psychosocial concerns. These medical and life changes, occurring at a vulnerable time, can last into adulthood and can lead to gaps in care and loss to follow-up after transfer to adult care. In contrast to pediatricians and pediatric trainees who are familiar with adolescent psychosocial concerns and behaviours, adult rheumatologists report having inadequate training in transition issues, specifically psychosocial concerns, and are less familiar with transition guidelines. The purpose of this study was to develop a survey to assess the comfort level, current practices, and barriers to provision of optimal care faced by adult rheumatologists in supporting young adults with rheumatic conditions in Canada.

Methods: Development of the survey began with a literature review in PubMed using the search terms "transition", "rheumatology" and "young adult". The majority of published surveys were targeted towards patients' experiences or pediatric rheumatologists and asked generalized questions pertaining to psychosocial concerns. Questions about confidence, transition education, current practices and barriers were developed using the milestones listed by the Royal College of Physicians and Surgeons of Canada for the entrustable professional activities (EPAs) applicable to care for patients transitioning to adult practice. Feedback was obtained from adult rheumatologists and the Canadian Rheumatology Association (CRA) Transition Working Group prior to finalizing survey questions.

Results: A 39-question survey was developed targeting Canadian adult rheumatologists and adult rheumatology trainees. The survey contained questions pertaining to demographics and transition practices. EPAs addressed included Core EPA 12P- "Supporting adolescents/young adults with rheumatologic disease in the transition from the pediatric to adult care setting". Topics covered in the survey included mental health, contraception, body image, sexuality, and drug use.

Conclusion: Transition to adult care can be a challenging process for patients, parents, and healthcare providers. By developing a survey that collects specific information about psychosocial concerns, we aim to understand current practices and identify barriers that adult rheumatologists face to inform future educational interventions and identify potential areas for quality improvement initiatives. The survey will be distributed electronically through the Canadian Rheumatology Association in both English and French in October 2021.

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Decline in Clinical Severity of Paget's Disease of Bone: Comparison Between a Contemporary Cohort and a Historical Cohort

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Objectives: European and Australian studies have reported a decrease in the prevalence, incidence and clinical severity of Paget's disease of bone (PDB). There are no studies on the clinical characteristics of PDB in the Quebec area. The purpose of this study was to describe the characteristics of patients with PDB diagnosed after the year 2000 in our region and to compare them to a historical cohort diagnosed before 2000.
Methods: In this retrospective descriptive cohort study, sociodemographic data and clinical characteristics for the contemporary cohort were collected from electronic medical records of patients with PDB followed at our university hospital. For the historical cohort, the same data were collected from the research files of PDB participants in our research program. Inclusion criteria were: age >18 years, having PDB diagnosed by a rheumatologist, and being followed in our hospital. Quantitative variables were reported as median and interquartile range and qualitative variables reported as percentage. Chi-square tests were used to compare categorical variables. Continuous values were compared with Wilcoxon-Mann-Whitney tests. Statistical analyzes were performed by the use of SAS 9.4. A p value <0.05 was considered statistically significant.
Results: 90 patients with PDB were identified in the contemporary cohort: 52.2% were men and 60% have monostotic involvement. 20.7% were symptomatic at diagnosis. In comparison to the historical cohort of 295 patients, patients in the contemporary cohort were older at diagnosis (68.3 ±12.6 vs 62.5 ± 10.9; p <0.0001). Statistically significant decreases were identified in total alkaline phosphatase levels at diagnosis (119.0 (85.0 – 181.0) vs 153.0 (96.0 – 254.0); p= 0.0178), pagetic bone number (1.0 (1.0 – 3.0) vs 2.0 (1.0 – 4.0) ; p = 0.0085), pagetic bone fractures (5.6% vs 28.3%; p= 0.0004), bone deformities (10.0% vs 44.0%; p <0.0001), and the percentage of patients who had orthopedic surgery related to PDB complications (7.8% vs 30.4%; p = 0.0079).There was no significant difference for pagetic bone pain (58.9% vs. 43.8%; p = 0.0605), secondary osteoarthritis (42.2% vs. 51.0%; p = 0.3739), and hearing impairment (57.9% vs. 52.9%; p = 0.7911).
Conclusion: The contemporary cohort is characterized by older age at diagnosis, a majority of monostotic disease and fewer complications of PDB. This decline in clinical severity of PDB in Quebec is consistent with studies reported in other countries.

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Increased Risk of Severe Infections and Mortality in Patients With Newly Diagnosed Antineutrophil Cytoplasmic Antibodyassociated Vasculitis: A Population-based Study

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Objectives: To evaluate the risk of severe infection and infection-related mortality among patients with newly diagnosed anti-neutrophil cytoplasmic antibody–associated vasculitis (AAV).
Methods: We conducted an age- and gender- matched cohort study of all patients with incident AAV between January 1, 1997 and March 31, 2015 using administrative health data from British Columbia, Canada. Primary outcome was the first severe infection after AAV onset necessitating hospitalization or occurring during hospitalization. Secondary outcomes were total number of severe infections and infection-related mortality.
Results: We identified 559 AAV patients and matched them with 5,590 non-AAV individuals

from the general population, yielding 187 and 510 first severe infections during 2,603 and 36,111 person-years follow-up, respectively. The crude incidence rate ratios for first severe infection and infection-related mortality were 5.08 (95% CI, 4.30-6.01) and 3.72 (95% CI, 2.44-5.67), respectively. The corresponding adjusted hazard ratios were 3.77 (95% CI 2.94-4.85) and 3.84 (95% CI, 2.13-6.91). AAV patients had an increased risk of a greater total number of severe infections with crude rate ratio of 5.07 (95% CI, 4.50-5.70) and adjusted rate ratio of 3.23 (95% CI, 2.77-3.78).
Conclusion: AAV is independently associated with increased risks of first severe infection (3.8-fold), a greater total number of severe infections (3.2-fold) and infection-related mortality (3.8-fold).

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Discontinuation/Switching After Etanercept Biosimilar (ETA-B) and Originator (ETA-O) Initiation in Rheumatoid Arthritis

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Objectives: The first biosimilar etanercept (ETA-B) was approved in Canada in 2016, but real-world data comparing therapy persistence of ETA-B with its equivalent originator product (ETA-O) remain scarce. We compared therapy changes (discontinuation/switching) after ETA-B and ETA-O initiation in rheumatoid arthritis (RA).
Methods: We selected a cohort of etanercept-naïve RA patients starting ETA-B or ETA-O between January 2016 and May 2020 from a prospective inception cohort in Canada. We restricted the analyses to patients with at least one follow-up visit within six months after treatment initiation. We assessed the first change of therapy, either discontinuation or switching (to any biologic, including ETA-O to ETA-B or vice-versa). We used Cox regression to compare time to first change in therapy (discontinuation/switching), between ETA-O and ETA-B. The model adjusted for sex, maternal race/ethnicity, and baseline age, RA duration, and use of any other prior biologic or prednisone.
Results: We studied 141 RA patients initiating etanercept (24% biosimilar) between 2016-2020. Biosimilar initiation increased over time, representing 27% of all etanercept new users in 2016-17 and 74% in 2018-19. During follow-up, there were 53 (38%) events (first discontinuation/switching) among 141 etanercept users, 43% in the ETA-O and 27% in the ETA-B group. In the multivariate analysis, we were unable to detect a clear difference in risk of discontinuation/switching, comparing ETA-B to ETA-O (hazard ratio 1.01, 95% confidence interval 0.52-1.95). Prednisone use at the time of ETA initiation was associated with a greater risk of discontinuation/switching.
Conclusion: Initiators of biosimilar etanercept in this RA sample increased over 2016-2019. We were unable to detect clear differences in discontinuation/switching, between ETA-B and ETA-O initiators.

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Mycophenolate and Azathioprine Are Associated with Risk of Hospitalized Viral Respiratory Infection in Rheumatoid Arthritis and Systemic Lupus

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Objectives: Rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) patients may be at a higher risk of severe infections because of their underlying condition and/or use of immunosuppressive medications. The objective of this study was to evaluate the risk factors for hospitalization for viral respiratory infections among RA and SLE patients. patients,
Methods: We studied adult RA and SLE individuals identified in the MarketScan database (2011-2018) with an outpatient diagnosis (including emergency room, ER) of viral pneumonia or other viral respiratory infections. We required patients to be covered in the medical/pharmacy plan one year before time zero (date of outpatient infection). The outcome was hospitalization for viral infection within the 30 days after time zero. We used multivariate Poisson regression models to assess risk factors associated with the outcome, including recent use (in the 90 days prior to time zero) of relevant medications: hydroxychloroquine (HQN) or chloroquine (CQ), methotrexate, mycophenolate (MMF), azathioprine (AZA), other immunosuppressants (cyclophosphamide, sulfasalazine, and leflunomide), corticosteroids, biologics, and NSAIDs, age, sex, setting in which viral infection was initially identified (ER or other), underlying condition (RA or SLE), and comorbidities.
Results: We identified 63,971 episodes of outpatient viral respiratory infections among 54,561 RA/SLE patients (80% female, average age 57.4 years, standard deviation 13.9 – Table 1). During the 30-day period following outpatient infection, we found 480 occurrences of hospitalization for viral respiratory infections. In adjusted multivariate analyses, use of MMF (adjusted RR, aRR 2.54, 95% CI: 1.51–4.28), AZA (aRR 1.90, 95% CI: 1.12–3.22) and corticosteroids (aRR 1.57, 95% CI: 1.29–1.91) were significantly associated with the risk of hospitalized viral respiratory infections. HQN/CQ was not associated with the outcome studied (aRR 0.89, 95% CI: 0.702–1.12). In the same model, comorbidities, ER presentation, and older age were also significantly associated with hospitalized viral infection.
Conclusion: Among RA/SLE patients with an outpatient viral infection, MMF and AZA, as well as corticosteroids, comorbidities, ER presentation and older age, were all significantly associated with subsequent need for hospitalization. Our results for HCQ/CQ are consistent with recent clinical trials showing no protective effect of these drugs to reduce the risk of severe COVID-19.
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Placental Changes in Pregnancies With anti-Ro/La Antibodies

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Objectives: Some maternal rheumatological conditions are known to be associated with placenta-mediated pregnancy complications, such as preeclampsia. Yet, placental changes in this population remain understudied. Our objectives were to review placental pathological changes in

anti-Ro/La-positive pregnancies and compare them to those observed in anti-Ro/La-negative pregnancies from mothers with and without rheumatic diseases.
Methods: Using an electronic database, we identified all pregnancies referred for fetal echocardiogram between 2013 and 2021 at the McGill University Health Centre, with the following key words within the clinical indication field: “congenital heart block”, “anti-Ro”, “anti-La”, “lupus”, “SLE”, “Sjogren”, or “mixed connective tissue disease”. Pregnancies with a fetus exhibiting cardiac anatomical and/or genetic anomalies were excluded. Pregnancies were classified as follows: 1) those with positive anti-Ro/La antibodies, 2) those with a rheumatic disease with negative anti-Ro/La, and 3) control pregnancies identified from the fetal echocardiography database without maternal rheumatic disease nor anti-Ro/La.
Results: Out of 117 pregnancies screened, 62 were included, with a total of 75 fetuses studied. In total, 55 placenta pathology results were available, for a total of 38 placenta in the first group, 9 in the second group and 8 in controls. Placenta was described as normal in only 34.2% of anti-Ro/La-exposed pregnancies and 44.4% of anti-Ro/La-negative autoimmune disease pregnancies compared to 75.0% of controls (p=0.27). Different pathological changes were observed (Table 1), including ischemic-hypoxic changes, chronic villitis, decreased placental weight, inappropriately advanced villous maturation and fetal vascular malperfusion, all more frequent in the anti-Ro/La-positive pregnancies, although not statistically significant. Interestingly, these changes occurred in the setting of having similar incidence of gestational hypertension (4 [8.5%] vs 2 [18.2%] vs 2 [11.8%], p=0.67), and preeclampsia/eclampsia (no cases).
Conclusion: Though limited by a small sample size, we observed a potential trend for more placental pathological anomalies in anti-Ro/La-exposed pregnancies compared to those from mothers with and without rheumatic disease. It is possible that confounding by maternal disease severity contributed to our findings. However, prior evidence demonstrates that anti-Ro/La antibodies are transported across the placenta via Fcγ receptors on the trophoblast and bind apoptotic fetal cells. Further studies are needed to investigate placental changes in anti-Ro/La-exposed pregnancies.

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Glucagon-Like Peptide 1 (GLP-1) Receptor Agonists in Patients with Obesity and Rheumatoid or Psoriatic Arthritis: A Scoping Review

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Objectives: Outline and appraise the literature evaluating the role of glucagon-like peptide 1 (GLP-1) receptor agonists for weight loss in patients with rheumatoid arthritis (RA) or psoriatic arthritis (PsA), as well as the effect of GLP-1 receptor agonists on disease activity in patients with RA or PsA with or without obesity.
Methods: MEDLINE, PubMed, and Embase were searched using permutations of the search terms: “GLP1”, “rheumatoid arthritis”, “psoriatic arthritis”, and “psoriasis”. English publications (including conference abstracts) evaluating the role of GLP-1 receptor agonists in RA, PsA, and psoriasis were eligible. Review articles, editorials, and studies assessing GLP-1 receptor agonists’ impact on patients without RA, PsA, or psoriasis were excluded. Articles were reviewed and data were extracted by one author. Articles were individually appraised, then grouped by design to identify prevailing findings.
Results: Fourteen studies were included, 4 pertaining to RA (2 basic science and 2 conference abstracts i.e., 1 case report and 1 uncontrolled prospective cohort) and 10 pertaining to psoriasis (1 basic science, 1 mouse model, 2 case reports, 1 combined case report/basic science, 3

uncontrolled prospective cohorts, and 2 randomized controlled trials). No studies primarily evaluating PsA were identified. Basic science experiments demonstrated potential immunomodulatory effects of GLP-1 receptor agonists. Reductions in oxidative stress and key proinflammatory cytokines and pathways were seen in two experiments using stimulated fibroblast-like synoviocytes as a model of RA. Similar anti-inflammatory effects were observed in psoriasis experiments through effects on invariant natural killer T cells and AMPK phosphorylation. Publications of GLP-1 receptor agonists in patients with RA were limited to two conference abstracts. One noted mean DAS-28 improvement (4.2 to 2.7) and weight loss (-3.4kg) in 9/15 participants (60%); the other described a change in DAS-28 from 5.5 to 3 after a patient started liraglutide. In psoriasis, 4 of 5 clinical studies (80%) demonstrated significant improvements in Psoriasis Area Severity Index and weight/BMI. No major adverse events were reported. Transient nausea was noted in 4/6 studies (67%). Common limitations included small sample sizes, short follow-up periods, and lack of control groups.
Conclusion: With established weight loss properties and possible immunomodulatory and anti-inflammatory effects, GLP-1 receptor agonists warrant further study as a potential adjunctive therapy in the management of rheumatoid and psoriatic arthritis in patients with obesity.

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Developing and Characterizing an Osteochondral Model for Evaluating Psoriatic Arthritis Therapies

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Objectives: The absence of a cure for psoriatic arthritis (PsA) and limited studies surrounding its models increases the need to develop a reliable PsA model. We are developing a high-throughput ex vivo PsA model that can capture the multi-tissue interactions often omitted in in vitro culture studies and challenging to conduct in in vivo models and evaluate novel therapeutic agents. Osteoarthritis (OA) and PsA share common features. OA is a less inflammatory disease than PsA. Therefore, samples from OA patients are commonly used as controls for studies in PsA. Our lab has developed and validated an explant co-culture model of cartilage and synovium tissues from end-stage OA patients to evaluate injectable therapies. This co-culture system is modified to include PsA synovial fluid (SF) and bone. The presence of bone is essential in the PsA model since both bone formation and bone destruction are seen in PsA joint. In addition, including PsA SF is critical since it is enriched with essential immune cells activated in PsA, such as T cells and macrophages. The overall objective is to develop and characterize a human osteochondral model for evaluating PsA therapies. Aim 1: Modify/optimize a human OA joint ex vivo model to be more representative of PsA. Aim 2: Validate the proposed model using an anti-IL17A drug, a standard treatment for PsA.
Methods: To develop the ex vivo model, SF is obtained from PsA patients, and tissues are obtained from OA patients following total knee replacement surgery. The groups in this study contain cartilage-bone and synovium (COCUL)+ medium; baseline, COCUL+ proinflammatory cytokines; positive control, COCUL +OA SF; OA group, and COCUL + PsA SF; PsA group. An anti-IL17A drug is used to validate this model. Following readouts are investigated; qPCR on cartilage-bone and synovium explant tissues, histology of cartilage-bone and synovium, ELISA on the secreted factors into the medium of all conditions.
Results: Histology confirms the maintenance of synovium architecture and increased cell

infiltration in the positive control, PsA and OA co-culture groups compared to the baseline. There has been an upregulation of genes associated with inflammation in the PsA group relative to the OA group. We are looking to add additional controls and do more optimizations to confirm these findings and validate them with an anti-IL-17 treatment.
Conclusion: Our model enables monitoring changes in the bone, cartilage, synovium in response to various factors such as proinflammatory cytokines and SF in an ex vivo environment.

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"It's a Dance Between Managing Both": A Qualitative Study Exploring Perspectives of Persons with Knee Osteoarthritis and Type 2 Diabetes Mellitus on the Impact of Osteoarthritis on Diabetes Management and Daily Life

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Objectives: The links between osteoarthritis (OA) and other common chronic conditions are increasingly being appreciated in epidemiological studies. Type 2 diabetes mellitus (T2DM) and knee OA commonly co-occur. Although concomitant symptomatic knee OA may increase risk of T2DM complications, no studies have examined patients' perspectives on the intersection and interrelationship of these conditions. We sought to explore individuals' experiences living with both knee OA and T2DM, with a focus on the impact of OA on T2DM management and daily life.
Methods: Semi-structured telephone interviews were conducted with 18 persons with a physician diagnosis of T2DM and symptomatic knee OA recruited from an urban family medicine clinic and a community arthritis rehabilitation program (Arthritis Society) in Ontario, Canada. Interview transcripts were inductively coded and analysed using thematic analysis, informed by interpretive description. Interviewing stopped after no new themes or subthemes were identified.
Results: The 18 participants were in the following age groups: two 40-49 years, two 50-59 years, five 60-69 years, and nine ≥70 years, included nine woman, and represented a range of both OA and T2DM disease severity. Three overarching themes were constructed: OA impacts diabetes control, OA is a health priority, and Minimization of OA by health care providers. Participants with T2DM described how concomitant painful, disabling knee OA made it difficult to engage in physical activity, negatively impacting blood sugar control. Joint pain itself, and the effect of pain on sleep and emotional health, were also seen to affect blood sugar control. Beyond diabetes management, the impact of OA-related pain and functional limitations on nearly all aspects of daily life led participants to view their OA as a health priority. Despite this, many participants relayed that their health care providers paid little attention to their OA, such that they were left to self-manage and advocate for their own OA care. Balancing both conditions required navigating a medical system that provided piecemeal disease-specific care.
Conclusion: These findings shed light on patients' experiences of living with symptomatic knee OA in the context of T2DM. Individuals with T2DM see symptomatic knee OA as a barrier to T2DM self-management and quality of life, yet are frequently met with insufficient support from health professionals. Greater recognition of and management of knee OA in persons with T2DM could help improve patient-centered care and disease outcomes.

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Cost Impact of Switching to Biosimilar Infliximab and Etanercept in British Columbia

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Objectives: Biosimilar medicines offer the potential for significant cost savings, but their uptake in North America has been relatively low. In 2019, the province of British Columbia (BC) became the first jurisdiction in North America to mandate switching from originator to biosimilar infliximab and etanercept in order to maintain coverage offered by the provincial government. We examined the impact of this policy on utilization and spending of the relevant biosimilars in patients with inflammatory arthritis and inflammatory bowel disease.

Methods: We used administrative data for the entire population of BC. Individuals were eligible for inclusion if they (1) were ≥ 18 years (2) had rheumatic or inflammatory bowel disease, and (3) were eligible for public drug coverage during the study period (Jan 2013 - Dec 2020). Individuals who ever received infliximab or etanercept and the number of switches were quantified. Using interrupted time series analysis, we examined the impact of the biosimilars policy on public and private payer spending on biosimilar infliximab and etanercept among individuals with diagnosis codes related rheumatic and inflammatory bowel disease.

Results: Over the entire study period, $607 million and $256 million was spent on infliximab and etanercept, respectively. Biosimilar spending was responsible for 9.9% and 12.9% of this expenditure on infliximab and etanercept, respectively. There was a sustained increase in the proportion of total spending on biosimilar etanercept and infliximab of 76.2% (95% CI 75.2, 77.2) and 80.9% (95% CI 77.7, 84.2), respectively, after the biosimilar policy was introduced, greater in the arthritis cohort than bowel disease. The overwhelming majority of switches to biosimilar infliximab (98.2%) and etanercept (94.4%) occurred post-policy.

Conclusion: There was a marked increase in biosimilar uptake, relative to the originator, after the introduction of a mandatory switching policy. The analysis is being updated with more recent data to understand the longer-term impact of the policy. It will also seek to understand patterns of those that switched compared to those that did not and potential impact on patients in terms of persistence on treatments and hospitalizations/physician visits. The results will help inform other provinces and jurisdictions in North America who are implementing or considering similar switching policies. Supported by a CIORA grant.

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Productivity Loss for Parents of Children With Arthritis: The Impact of Disease Activity Status

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Arthritis Network (Toronto)

Objectives: This study estimates the loss of productivity of parents who care for children with juvenile idiopathic arthritis (JIA) and explore the impact of the disease activity status.

Methods: The ongoing prospective, multicenter study "Canada-Netherlands Personalized Medicine Network in Childhood Arthritis and Rheumatic Diseases (UCAN CAN-DU)" enrols children younger than 18, diagnosed with JIA and their parents from centers across Canada and the Netherlands. The family-reported socioeconomic disease burden was captured in standardized e-health instruments including the validated Work Productivity and Activity Impairment Questionnaire (WPAI): Specific Health Problems. WPAI measures the number of hours missed due to child's health and due to other reasons, hours worked, degree their child's health affected productivity while working (0-10, where 0 represents no effect and 10 complete impairment), and in regular unpaid activities (0-10) for a period of seven days. Absenteeism was calculated as the average percent of hours of work time missed, and presenteeism as the average percent impairment while working due to child's JIA. Demographics for both patients and caregivers, and disease status (i.e., active, and inactive using Wallace criteria) of the patient were also collected on the e-health platform. Results were described using mean, standard deviation (SD), and proportion, and compared by disease status using two-way t-tests.

Results: A total of 209 caregivers answered the questionnaires at baseline. Parent's mean age was 43 years (SD:7.1), and 74% (n=154) were female. Most children with JIA (79%, n=165) experienced active disease at baseline. Most parent participants (79%, n=165) were employed, and this percentage was lower for children with inactive disease status (81.8% vs 67.5%, for active and inactive disease, respectively). Among employed parents, for a period of seven days, a mean of 3.5 hours (SD:5.0) was missed due to child's JIA (absenteeism percentage: 11% (SD 15.0)), and 1.8 hours (SD:5.9) due to other reasons. The absenteeism percentage was statistically different between active and inactive disease status (12.1% vs 6.4%, $p<0.05$, respectively). The degree to which their child's health affected work productivity and productivity in regular unpaid activities was 1.9 (SD:2.1) and 2.1 (SD:2.4), respectively. The mean presenteeism percentage was 19.3% (SD:21.1), also statistically higher for active than for inactive disease, (21.3% vs 9.2%, $p<0.05$, respectively). Results are summarized in Table 1.

Conclusion: JIA results in socioeconomic burden to parents, including impact on absenteeism and presenteeism measures. However, those effects were significantly lower in parents of children experienced inactive disease status at the time.

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Transition Us Together: Development of a Parent-Centered Toolkit to Support Adolescents with Rheumatic Disease Transition to Adult Care

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Objectives: The management of pediatric rheumatic disease in adolescents is complex, due to intricacies of treatment, attention required for disease monitoring, the interplay between physical health, psychosocial wellbeing and challenges associated with their transition from pediatric to adult healthcare systems. This transition is marked by higher symptom burden and higher morbidity and mortality. Within pediatric rheumatology, up to 50% of transfers to adult care are unsuccessful, with loss-to-follow-up and low treatment adherence being the most common issues. Parents also face challenges in understanding their changing role and how to support their children during this time. To date, few resources have focused on supporting both parents and

patients through this period. Our team sought to develop a patient- and parent-oriented toolkit to support families as they prepare for the transfer to adult rheumatology care.
Methods: Our multidisciplinary team developed a toolkit for patients and their parents to help prepare them for the transition to adult care. The toolkit was created using an iterative process (Figure 1) of reviewing existing resources with guidance and feedback from rheumatology patients and their parents. Input from other patient populations was sought from the Family and Youth Advisory Councils at McMaster Children's Hospital.
Results: The two components of the toolkit include a Transition Road Map and a Parent Guide to Transition. Five domains of transition readiness were established as pillars of the Road Map: Self-Advocacy, Medication Management, Overall Health and Safety, Lifestyle and Behaviours, and Future Planning. Within each domain, a checklist to achieve self-management was created, with each intended to be generalizable to adolescents with any rheumatic condition but could also be adapted to other chronic conditions. Feedback from the Youth Advisory Council included comments such as "I wish this existed in Pediatric Cardiology clinic". Further, items on each checklist can be completed at an adolescent's own pace, in any order, and can continue to be worked on as they transfer to adult care. The Parent Guide describes the transition process, highlights important information including the differences between pediatric and adult care, and provides tips to parents on supporting and empowering their child towards being a leader and advocate for their own care.
Conclusion: A Parent Toolkit directed at the Transition from Pediatric to Adult Rheumatology Care was co-created, with multiple stakeholders, and was well received by youth with various conditions. Ongoing research on its impact on transition readiness of youth and transition experiences of parents is underway.

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High Adolescent Health Needs and Relationship to Disease in Patients with Childhood-Onset Systemic Lupus Erythematosus

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Objectives: To characterize the burden of adolescent health issues faced by patients with childhood-onset systemic lupus erythematosus (cSLE), as well as describe demographic and disease characteristics associated with adverse adolescent health.
Methods: We conducted a retrospective cohort study of adolescents age 12-18 years with cSLE who were seen by Adolescent Medicine (AM) specialists in the Lupus Clinic at SickKids Hospital between July 2018-July 2020. As part of our cSLE care model, patients presenting with adolescent health issues were routinely seen by AM. Adolescent health issues were characterized using the HEADDSS framework (Home, Education/employment, peer group Activities, Drugs, Sexuality, and Suicide/depression), which was standardly recorded for all AM visits. Issues were classified as presenting and/or identified problems at each visit. Adolescent health burden was tabulated as the number of individual adolescent issues identified per patient. Multiple Poisson

regression was used to examine associated patient factors, including age, gender, material deprivation score (measure of social marginalization that accounts for income, housing quality, educational attainment, and family structure), SLE disease activity and damage indices, and high-dose glucocorticoid exposure (> 3 months and any-time dose of > 30mg prednisone equivalent).
Results: 226 adolescents with cSLE were seen in the Lupus Clinic during the observation period, of which 106 (47%) were seen by AM. Of these, 88 (83%) were female. Median age at first visit was 14 years (IQR 13, 16). Patients had a median of 2 (1, 3) visits with AM over the study period. Figure 1 shows the range of adolescent health issues described across all visits, of which mood was identified as the top adolescent issue (presenting problem in 22%, and identified issue in 51% of patients). Patients had an average of 2.8 ± 2.31 separate adolescent health issues identified. In multiple regression analyses, higher adolescent issue burden was associated with higher glucocorticoid exposure (RR=1.72, 95% CI 1.32-2.24), disease damage (RR=1.30, 95% CI 1.30, 95% CI 0.99-1.70), higher material deprivation (RR=1.16, CI 1.03-1.29), and lower disease activity (RR=0.96, 95% CI 0.92-0.99). The most common service provided by AM was psychoeducation at 54%.
Conclusion: Adolescents with cSLE experience a wide range of physical and psychosocial issues in addition to their underlying disease. We found that increased cSLE disease severity and social marginalization put teens at higher risk of worse adolescent health issues, highlighting the need to discuss adolescent health during rheumatology clinic visits, and the importance of integrating AM specialists into routine cSLE care. Best Abstract on Pediatric Research by Young Faculty Award.

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Assessing a Nursing Inter-Professional Model of Care in Rheumatology

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Objectives: Canada faces rheumatology work-force shortages, with wide regional disparities, causing rural areas to be underserviced. New ways of providing rheumatology care are needed to improve access, especially in rural areas, prevent physician burn-out, and reduce health inequities. This study aimed to evaluate an inter-professional model of care implemented in rural Penticton, BC; to assess whether it improves access to rheumatologist care for inflammatory arthritis (IA) while providing high quality care.
Methods: We assessed access to, process and outcome of care, using Arthritis Alliance of Canada's IA system-level performance measures. Electronic medical records data were extracted on all IA patients seen in 2019 (i.e. pre-COVID-19). The model consists of rheumatology nurses seeing patients first, taking histories, performing joint counts, addressing issues from nursing perspective, and identifying what the rheumatologist should address. This allows rheumatologists to focus on the most relevant or complex medical issues and on discussing management, with the aim of providing quality care more time-efficiently. Measures included: no. new/follow-up patients seen, wait time from referral to new consultation, continuity of care (%RA patients seen in yearly follow-up), extent and timeliness of DMARDs in RA; %RA patients meeting DAS-28 disease activity target and good physical function (HAQ<1.0).
Results: In 2019, 3952 visits occurred in 1175 IA patients, including 214 new patients (RA:568/72, PsA:499/132, AS:77/4, IBD-arthritis:31/5), yielding a mean 32.3 follow-up visits

and 3.5 new consults per clinic day worked. Median (25th;75th percentile) wait time for new consults was 104(50;222) days in RA, 121(62;281) in PsA, and 107(44;1416) in AS. Only 7% of RA patients met the 28-day wait time alliance benchmark. Of RA patients seen in 2013-2018, yearly follow-up occurred in 69.4% . Of RA patients seen in 2019, 89.8% were prescribed a DMARD. In new RA patients, DMARDs were prescribed at initial consultation visit in most [median (25th;75th;90th percentile) no. days from RA diagnosis: 0(0;1;97)], with 83.9% meeting the 14 day benchmark for starting DMARDs. Disease activity, calculated in 476 RA patients, met target in 86.3% (remission:53.1%, low disease activity:33.2%). Mean (SD) HAQ (n=566 RA), was 0.77(0.67), with 67% having good physical function.
Conclusion: This inter-professional nursing model of care allows greater access to care in underserviced areas while maintaining high quality care, thus improving efficiency of service delivery where rheumatology workforce is sparse, and reducing inequities in access to arthritis care. Despite greater efficiency of care delivery, wait times for new consults in IA patients in this rural underserviced area remain suboptimal.

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Telehealth: Enhancing the Role of Rheumatology Nursing Support

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Objectives: COVID-19 has precipitated a necessary and rapid shift away from the traditional and predominant model of care delivery for rheumatology patients in British Columbia (BC). Rheumatologists in the province have had to adapt to offer telehealth, now viewed as a safe medium, to provide care for their patients. Moreover, telehealth is considered to be an effective medium for follow up visits that do not require procedures and immediate physical examination. The discipline has thus pivoted towards a hybrid model of in-person and virtual care. Prior to the COVID-19 pandemic, nurses played an essential role in the education and teaching of rheumatology patients. With the prompt switch to virtual platforms, nurses continue to offer similar support. The objective of this study is to explore the attitudes and perceptions of patients and nurses regarding the expansion of telehealth nursing care to gain a better understanding on the current and potential enhanced role of nurses in virtual rheumatology care.
Methods: This qualitative study was conducted in January 2021. The study included virtual semi-structured interviews with six rheumatology patients from four Canadian provinces, Alberta, British Columbia, Ontario, and Saskatchewan, and one virtual focus group composed of six rheumatology nurses based in BC. Data analysis was iterative, occurring as interviews proceeded and used a thematic approach.
Results: Most nurses reported using telehealth to provide care for their patients during the pandemic, with some nurses having in-person visits for first-time appointments, unstable patients, or administering injections. The nurses described their experience with telehealth as evolving and changing over time. Attending to the mental health needs of patients, performing physical assessment, time constraints, language barriers, and patients' technology literacy were perceived by participating nurses as challenges during care provision via telehealth. Patients were most comfortable with telehealth nursing support for responding to email questions, counselling virtually, reviewing laboratory results and recommending in-person or allied health assessments. Patients were least comfortable with nurses altering advanced therapies or disease modifying drugs.
Conclusion: This study serves as a framework to support the improvement of rheumatology telehealth nursing in BC, and it establishes suggestions on the best ways to integrate virtual

nursing care. Furthermore, activities that are suitable for nursing telehealth care in rheumatology practice are outlined, specifically those that are highly acceptable to rheumatology nurses and patients.

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Effectiveness Outcomes Reported in Rheumatology Transition Literature: A Scoping Review

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Objectives: Young people with pediatric-onset rheumatic disease continue to experience active disease and associated morbidities in adulthood. Transition programs can help prepare young people for transfer to adult care and ensure that care is maintained through adulthood. However, transition literature measures "success" of transition programs and transfers to adult care with different definitions and outcomes. A scoping review of rheumatology transition literature was conducted with the objectives of: 1) identifying these outcomes, and 2) the frequency with which they are used.

Methods: A review was performed in duplicate by adapting a previously published search strategy. Six databases (CINAHL, EMBASE, HaPI, MEDLINE, PsychINFO and Web of Science) were searched. The inclusion criteria were: 1) Primary study design 2) Full-text articles 3) Transition clinics focused on pediatric to adult care 4) Rheumatic conditions 5) Outcomes measured and reported 6) English language articles. Of 803 abstracts, 35 full-text articles were reviewed and 13 met the inclusion criteria.

Results: Of 13 studies, 8 (61.5%) studies reported outcomes of healthcare-related self-management skills. Quality of life or overall health assessment was used as an outcome in 7 (53.8%) studies, while 6 (46.2%) studies measured patient-reported experience/satisfaction outcomes. Transfer success/completion was used as an outcome in 4 (30.8%) studies. Disease activity was reported in 4 (30.8%) studies. There were no studies that reported transition readiness scales. Healthcare-related self-management skills can be further broken down into specific skills that were reported as outcomes. Of the 8 studies, 5 (62.5%) looked at medication management, 2 (25%) noted medication adherence, and 2 (25%) looked at managing medical appointments.

Conclusion: This review identified several categories of outcomes used to determine successful transition programs and transfers. The variability between outcomes used to measure success makes comparisons between transition programs difficult. Future studies should determine which category of outcome best correlates with a successful transition to allow for standardization in rheumatology transition clinics.

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Supply and Services of the Pediatric Rheumatology Workforce in Ontario

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Objectives: The purpose of this study was to evaluate the annual supply and services of pediatric rheumatologists in Ontario between 2010 and 2019.

Methods: This was a retrospective population-based study using repeated cross-sections of outcome data on population denominators of the pediatric population (aged ≤18 years). Pediatric rheumatologists were identified and verified across two administrative databases, the ICES Physician Database and the Corporate Provider Database. We identified all patients with pediatric rheumatology encounters within the Ontario Health Insurance Plan (OHIP) Claims Database, which includes all fee-for-service and shadow billing claims, diagnoses, and dates of services associated with each encounter. Using annual population denominators, we determined the percentage of Ontario children with encounters annually, as well as rates of total encounters expressed per 1,000 children. Patient demographic characteristics were described including sex and travel distance in kilometres (km) to the nearest pediatric rheumatologist. Diagnosis codes from outpatient encounters were used to assess the case mix of patients.
Results: From April 1, 2010 and March 31, 2019, the number of pediatric rheumatologists increased from 15 to 27, with a corresponding supply increase from 0.51 to 0.91 pediatric rheumatologists per 100,000 children. Across the same period, the annual number of patients seen by pediatric rheumatologists increased from 9,688 to 13,811 total patients (53% female), representing 0.33% to 0.47% of all children. The number of new consultations each year during the study period ranged between 6,015 and 8,595 patients, which corresponds to 2-3 new consultations per 1,000 children. The annual total number of patient visits (new and repeat encounters) increased from 19,462 to 32,670 visits across the study period. Shadow billing claims comprised a large proportion of patient billing claims, reflecting services from tertiary centres; 7,915 (41%) were shadow claims in 2010, and 10,922 (33%) were shadow claims by 2019. Across all years, 29-33% of all encounters were associated with a systemic inflammatory disease diagnosis code. In 2018, 794 (5.8%) patients travelled >100 km to see their pediatric rheumatologist.
Conclusion: The annual supply and services of pediatric rheumatologists has increased in Ontario over the past decade. Our findings provide additional information for rheumatology workforce planning. Furthermore, the volume of shadow billing claims provides some reassurance on the use of administrative data for research purposes.

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Economic Evaluation of Hydroxychloroquine Use in an International SLE Inception Cohort

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Objectives: While there is overwhelming evidence for the beneficial role of hydroxychloroquine (HCQ) in SLE, little is known about its economic impact. We estimated annual direct, indirect, and total costs (DC, IC, TC) associated with HCQ use.
Methods: A subset of patients from the Systemic Lupus Erythematosus International Collaborating Clinics (SLICC) inception cohort were assessed annually between 2014 and 2019 for health resource use, lost work-force/non-work-force productivity and concurrent HCQ use. Resource use was costed using 2021 Canadian prices and lost productivity using Statistics Canada age-and-sex specific wages. At each assessment, HCQ dose over the past year and weight were documented and patients were stratified into 1 of 3 HCQ dosage groups: non-users (0 mg/kg/day), low-intensity users (≤ 5 mg/kg/day), or high-intensity users (>5 mg/kg/day). Costs associated with HCQ dose were calculated by averaging all observations within each

dosage group. Multiple random effects linear regressions adjusted for the possible confounding of age at diagnosis, sex, race/ethnicity, disease duration, geographic region, education, alcohol use, and smoking on the association between annual DC and IC and HCQ dose. A possible mediating effect of disease damage (SLICC/ACR DI) on these associations was also investigated.
Results: 661 patients (89.4% female, 59.3% non-Caucasian race/ethnicity, mean age and mean disease duration at the start of economic assessments was 42.1 years and 9.5 years, respectively) were followed over a mean of 2.8 years. Across 1536 annual assessments, 36.1% of observations were provided by HCQ non-users, 43.1% by low-intensity users (mean dosage 3.4 mg/kg/day), and 20.8% by high-intensity users (mean dosage 5.9 mg/kg/day). Annual adjusted DC were higher in non-users ($9599) versus low-intensity users ($6344) and high-intensity users ($6333) (Table 1). When disease damage was included in the regression, there were no significant differences in DC between dosage groups. While unadjusted IC were higher in non-users ($37,610) versus low-intensity users ($32,480) and high-intensity users ($31,418), adjusted IC did not differ. Adjusted TC were higher in non-users ($46,157) versus low-intensity users ($39,257) and high-intensity users ($37,634).
Conclusion: SLE patients reported higher adjusted annual DC and TC during periods of HCQ non-use versus periods of use, regardless of the intensity of use. There was no additional cost savings in those using high intensity dosages. The cost-savings effect of HCQ could potentially be partially mediated through reduced damage. In addition to its well-established therapeutic potential, there may be an economic imperative for HCQ use in SLE patients.

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Accessing Care for Rheumatoid Arthritis: A Critical Interpretive Synthesis

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Objectives: We conducted a Critical Interpretive Synthesis (CIS) of the literature to answer the following questions about how individuals living with rheumatoid arthritis (RA) seek care: - How do individual characteristics, the nature of the disease, and its presentation influence help-seeking and their acceptance of services offered? - How do interactions with their primary care providers influence ability to secure appropriate treatment or referral? - How does the configuration of health services influence their perception of the accessibility of appropriate care? - How do environmental factors influence access to care?
Methods: CIS combines systematic review search strategies with adapted ethnographic review design and grounded theory analysis. Its outcome is a coherent theoretical framework that describes the complexity in timely access to care. Using a systematic review search strategy, 708 abstracts were screened, and 97 full articles reviewed. The findings of included articles were coded into themes and subthemes using NVivo. A Framework Analytic Approach was adopted to code inductively, and deductively using dimensions of the Candidacy Approach to understand patient access to care.
Results: Our principal finding was that access to RA care was delayed on several levels. From a patient level, people struggled to identify their symptoms as abnormal and in need of professional attention. From a healthcare level, the configuration of the health care system (e.g., mode of delivery, lack of linguistic sensitivity, staff unavailability) may impede navigation through the care continuum. Once in the physician's office, individual patient characteristics,

such as their socioeconomic status, gender, experience with the healthcare system, and sense of identity all influenced their presentation to care. The physician's appraisal of patient need may also depend on the patient's characteristics; physician decision-making is also contingent on their approach to care, training, and the availability of rheumatologists. The availability of resources such as medications or physiotherapy is also salient, as is the extent to which outcomes are monitored and communication between providers is fostered. At an environmental level, the geographic and physical location can have profound effects on access especially in rural or remote communities.

Conclusion: Improving access to care for RA requires a multipronged approach to increase general population knowledge about the condition, and to ensure that all physicians are trained to apply person-centered, holistic approaches which respond to the social determinants of health. Interdisciplinary care teams with superior communication, role clarity, and flexible modes of delivery are essential. Staffing and resources to support timely access are crucial.

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Can a Questionnaire Reliably Identify Improvement and Worsening in the RA Disease Activity? Implications for use of RA-FQ for Telehealth

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Objectives: The RA-FQ is a patient-reported measure that can be used to identify disease flares in RA. The RA-FQ asks about pain, physical function, fatigue, stiffness, and participation and yields a score from 0-50. We previously reported on reliability, validity, and responsiveness. In the era of COVID where in-person visits are not always feasible, our goal was to identify the score changes for RA-FQ associated with minimal and meaningful improvement or worsening as judged by patients, treating rheumatologists, and in relation to disease activity indices.

Methods: We used data from adults with early RA (symptoms <1 year) enrolled in the CATCH (Canadian Early Arthritis Cohort), a prospective study of real-world patients treated across Canada. Participants completed the RA-FQ, Patient Global, and RA Global Change Impression item (a little vs. a lot better or worse or same) at 3- and 6-month visits. Rheumatologists recorded joint counts and MD Global. We compared mean change across categories of improvement and worsening disease activity using patient, physician and CDAI anchors.

Results: The 808 adults were mostly white (84%) women (71%) with a mean (SD) age of 55 (15) and moderate-high disease activity (85%) at enrollment. At the second visit, 79% of patients reported that their RA had changed; 59% were better and 20% worse. Patients who were a lot worse had a mean increase of 8.9 points whereas those who rated themselves as a lot better had a -6.0 decrease on the RA-FQ (Table). Minimal worsening and improvement were associated with 4.7 and -1.8 change on the RA-FQ, respectively, while patients who rated their RA unchanged had stable RA-FQ scores. Physicians and CDAI classified more patients as worse than using patients' self-ratings, and minimal and meaningful RA-FQ thresholds differed by group. Similar changes were evident in CDAI, SDAI, and DAS indices (Table). Larger differences were

observed with patient vs. physician global scores and tender vs. swollen joints. Across measures, the change associated with worsening was greater than for improvement. Results supported all prespecified hypotheses.
Conclusion: In this large ERA cohort, the RA-FQ was responsive to change and generally distinguished between minimal and meaningful improvement and worsening. These data add to growing evidence demonstrating robust psychometric properties of the RA-FQ and contribute new evidence supporting its use in RA care and research when in-person visits may not be feasible. Results also offer initial guidance about the amount of change associated with minimal and meaningful improvement or worsening in RA.

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Key Factors for the Development and Implementation of a Patient Dashboard in Rheumatology: Review of Literature

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Objectives: To identify key factors to inform patient dashboard content, design, development, and implementation in Rheum4U Precision Health Registry. Inflammatory arthritis (IA) affects approximately one million Canadians who, if untreated, can experience irreparable joint damage, pain, and disability. The cost of IA in Canada is estimated to reach over $257 billion by 2040. Despite significant improvements in therapies and Treat-to-Target strategies, remission rates and low disease activity could be improved. Patient dashboards visualize individual patient disease data over time and are proven to successfully support the management of many chronic conditions. Patient-centered care incorporating shared decision making that facilitates patient-physician interaction about adherence, understanding of disease, and outcomes considered important by patients, still lacks. Patient-dashboards, co-designed by patients and health-care providers, can alleviate this gap and improve the overall quality of care. Such dashboards can be particularly helpful for patients having difficulty reaching or sustaining remission or low-disease activity.
Methods: A rapid review of scientific and gray literature was conducted for publications up to July 2021. Research questions and search terms were identified, and queried databases included MEDLINE, Science Direct. Search terms included: rheumatology, patient dashboard, patient-reported outcomes, shared decision making, patient reported outcomes, human-centered design. Dashboard development for other chronic conditions like diabetes, was also queried.
Results: The literature search yielded 21 relevant articles. Physician/patient co-design analyzes user needs to determine distinct preferences for patient-facing dashboards. Dashboard content included: disease activity over time, outcomes, composite scores, demographics, and after visit summary, and clinic notes. Patients expressed interest in dashboards to also include holistic measures such as diet and stress. A combination of simple graphics and descriptions, with minimal cognitive load, is preferred by patients to help them easily understand the measures represented. Linking each measure to literacy level–appropriate educational materials has further enhanced use for patients. Human-centered design principals, including assessing user needs, prototyping design concepts, testing concepts with user, and pilot testing, supports

successful dashboard development. User engagement incorporating motivational strategies, such as progress tracking and goal setting, further enhances dashboard use.
Conclusion: Several key factors can increase the likelihood of successful implementation of a patient dashboard including a user-centered approach to co-design, simple graphics with descriptions of the measures, a broad range of holistic measures, and the application of motivational strategies.

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Impact of Early Antimalarial Adherence on Future Acute Care Utilization in Patients with Newly Diagnosed Rheumatoid Arthritis and Systemic Lupus Erythematosus: A Population-based Study

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Objectives: To examine the association between antimalarial (AM) adherence and acute care utilization among newly diagnosed rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) patients.
Methods: We used administrative databases for British Columbia, Canada, to conduct a retrospective, population-based propensity score (PS) matched study of incident cohorts of RA and SLE with incident AM use. The incident RA and SLE cases first met previously published RA and SLE criteria for administrative data between January 1997 and March 2014. Follow-up started on the first day of having AM and either RA or SLE, and only subjects with at least one year of follow-up were retained. In the first year ("baseline year"), we calculated AM adherence using proportion of days covered (PDC) and categorized as adherent ($PDC \geq 0.90$) or non-adherent ($0 \leq PDC < 0.90$). We computed PS for AM adherence using baseline variables (age, cohort entry year, sex, residence, income quintile, RA or SLE duration, prior AM use duration at cohort entry date, medication use, numbers of hospital admissions and hospitalized days, outpatient visits and related costs and Charlson comorbidity index) evaluated in 12 months before the cohort entry date. Each AM adherent patient was PS matched with up to two AM non-adherent patients using the greedy matching algorithm. Our outcomes include the numbers of hospital admissions and hospitalized days assessed in the following year ("follow-up year"). We used quasi-Poisson regression models with robust standard errors to examine the impact of AM adherence at the baseline year on these two outcomes in the follow-up year, adjusting for above baseline variables.
Results: We identified 6151 baseline AM adherent (mean age 56.6 years, 74.7% were women) and 11624 matched baseline non-adherent (mean age 55.4 years, 75.6% were women) incident RA and SLE patients. The crude rates for hospital admissions were 0.39 and 0.42 per person-year for adherent and non-adherent patients in the follow-up year, respectively. The respective crude rates for hospitalized days were 2.18 and 2.66 per person-year. Using the quasi-Poisson models, the adjusted rate ratios (RRs) of hospital admissions and hospitalized days obtained for AM adherent patients were 0.87 (95% CI: 0.82-0.93) and 0.78 (95% CI: 0.69-0.89), respectively, compared to AM non-adherent patients (Table 1).

Conclusion: RA and SLE patients adhering to AM therapy are associated with a lower risk of future acute care utilization (13% reduction in the risk of hospital admission and 22% reduction in the number of hospitalized days) than non-adherent patients.

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Investigating the Determinants of Accessing Social and News Media and Experiencing Negative Impacts during COVID-19 in an International SLE Sample

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Objectives: We assessed the determinants of SLE patients accessing health information in social and news media, and self-reporting negative health impacts associated with accessing health information through these sources.

Methods: SLE patients were recruited from 15 patient cohorts and five advocacy organizations. They completed an online survey (06/2020-04/2021) about sources of health information accessed preceding (pre-03/11/2020) and during (post-03/11/2020) COVID-19. Multivariate logistic regression was used to explore factors associated with: 1) accessing social media, 2) news media, and 3) self-reporting negative impacts from health information accessed through these sources, adjusting for region, sociodemographics, SLE characteristics, and access to/trust in sources.

Results: 1935 patients (Asia n=201, Canada n=845, Europe n=324, Latin America (LA) n=118, US n=447) completed the survey (27.1% response rate): 92.7% female, 35.2% non-white race/ethnicity, mean age at diagnosis 32.0 years (SD 13.3), and mean disease duration 16.6 years (SD 12.0). 21.6% and 37.0% reported accessing health information often/always through social and news media, respectively, and 17.0% reported being negatively impacted by information accessed through these sources. Respondents in Europe and LA vs Canada were more likely to access social (Europe: OR:1.46, 95%CI: 1.03, 2.07; LA: OR:2.19, 95%CI: 1.36, 3.56) and news media (Europe OR:1.77, 95%CI: 1.26, 2.49; LA OR:1.71, 95%CI: 1.03, 2.83), and those in the US were less likely to access social media (OR:0.58, 95%CI: 0.40, 0.84). Females were more likely (OR:2.02, 95%CI; 1.17, 3.49), while older participants were less likely to access this source (OR:0.98, 95%CI: 0.97, 0.99). Patients accessing family physicians post-03/11/2020 were less likely to access social (OR:0.70, 95%CI: 0.54, 0.92) and news (OR:0.64, 95%CI: 0.50, 0.80) media, and those reporting trust in social (OR:3.18, 95%CI: 2.45, 4.14) and news media

(OR:4.33, 95%CI: 3.40, 5.52) were more likely to access each, respectively. Those in Asia vs Canada (OR:0.34, 95%CI: 0.17, 0.66) and older participants (OR:0.97, 95%CI: 0.96, 0.99) were less likely to be negatively impacted, and females (OR:2.27, 95%CI: 1.15, 4.47) were more likely to be negatively impacted. While individuals with post-secondary education were less likely to be negatively impacted (OR:0.60, 95%CI: 0.40, 0.90), those with post-secondary education in Europe (OR:3.56, 95%CI: 1.75, 7.30) and LA (OR:4.37, 95%CI: 1.44, 13.30) were more likely to report negative impacts.
Conclusion: Region, age, gender, access to family physicians, and education are determinants of accessing social/news media and/or self-reporting negative impacts of accessing health information through these sources. This study emphasizes the need for targeted health messaging based on demographics and geography.

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Health Information Use by SLE Patients Pre and During COVID-19

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Objectives: We conducted an online survey to assess how SLE patients access and trust health information pre and during COVID-19.
Methods: Canadian and international patients were recruited from 15 patient cohorts and five advocacy organizations. Participants completed an online survey from 06/2020-04/2021 regarding the sources of health information they accessed in the 12 months preceding (pre-03/11/2020) and during COVID-19 (post-03/11/2020). We calculated the percentage of patients accessing each source, their preferred sources, and the level of trust in each source. McNemar tests were used to compare frequencies pre and post 03/11/2020 in both samples.
Results: 845 Canadian and 1090 international (Asia n=201, Europe n=324, Latin America n=118, US n=447) patients completed the survey (40.4% and 21.0% response rates, respectively); 78.0% were recruited through SLE research cohorts, 92.7% were female, 76.6% had completed post-secondary education, 35.2% reported non-white race/ethnicity, mean age at diagnosis was 32.0 years (SD 13.3) and mean disease duration was 16.6 years (SD 12.0). Canadian and international patients accessed news media more frequently during vs pre pandemic (44.6% of Canadians accessed sometimes/often/always pre vs 52.1% during; 59.8% of

international participants accessed pre vs 68.9% during), while access to family physicians (Canada: 59.6% pre vs 48.5% during; international 53.4% pre vs 49.9% during) and lupus specialists (Canada: 72.0% pre vs 57.8% during; international 82.8% pre vs 77.7% during) decreased in both samples during the pandemic (Table 1). Lupus specialists (1st) and family physicians (2nd) were ranked the most preferred sources in both samples pre and during the pandemic. News media was more preferred post (3rd) vs pre-03/11/2020 (4th) in both samples, yet was considered less trustworthy in Canada (44.5% rated online news media as somewhat/very trustworthy pre vs 41.8% post) and internationally (43.0% pre vs 40.2% post) during COVID-19. In both samples, advocacy organizations were accessed less frequently pre (Canada: 31.1%; international: 40.9%) and during COVID-19 (Canada: 28.6%; international: 44.1%) than other less preferred and trusted sources (e.g., peers, social media), and trust in advocacy organizations decreased during the pandemic in both Canadian and international samples by 4.1% and 5.0%, respectively.

Conclusion: Although lupus specialists and family physicians were ranked as the most preferred sources, patients accessed these sources less frequently during the pandemic and accessed news media, a less trusted source, more frequently. To increase accessibility to preferred and trusted sources, virtual visits should be promoted where not already in place. This research will improve existing information dissemination pathways valued by patients.

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Potential Biomarkers of Cognitive Impairment in the Context of Childhood-Onset Systemic Lupus Erythematosus

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Objectives: 23%-60% of children with childhood-onset systemic lupus erythematosus (cSLE) report cognitive complaints, yet neuropsychiatric lupus (NPSLE) remains challenging to diagnose and treat. To increase understanding of mechanisms underlying this disease, we examined the quantitative association between cognitive function, demographic and disease measures, and structural neuroimaging metrics.

Methods: We examined a cross-sectional sample of 27 patients with cSLE (ages 12-17) meeting ACR or SLICC classification criteria. Patients completed standardized traditional neurocognitive tests quantifying domains of attention, working memory, and cognitive flexibility. From these three scores, we quantified the cognitive function of each patient as a point in 3-dimensional space. Cognitive impairment was defined as a score 1.5 standard deviations below the mean in any domain. T1-weighted brain magnetic resonance images (MRI) were obtained using a 3T

scanner. Volume, cortical thickness, and surface area metrics were extracted for 101 brain segments. Demographic and disease measures were extracted from medical records. We used Partial Least-Squares Regression (PLS2) to examine the association between cognitive function and its potential predictors: structural brain metrics as well as disease and demographic measures. PLS2 enables linear regressions between multidimensional data with a relatively small sample size. Each predictor's relevance criteria (i.e., stability and significance) were based on the bootstrapped sample distribution of its variable importance in projection (VIP) value, which summarizes the weight of a predictor in the linear model.
Results: Cognitive impairment was present in 41% (11/27) of patients; only one subject had a diagnosis of NPSLE. In PSL2 (Figure 1), 38 predictors were found to be relevant in the estimation of cognitive function (CI=95%, VIP>1). Of these, 37 were brain structure variables deriving from the frontal lobe (n=11), cingulate cortex (n=10), subcortical structures (n=6), parietal lobe (n=4), temporal lobe (n=3) and occipital lobe (n=3). The only non-structural measure found to be significantly predictive of cognitive function was the SLICC damage index (SDI).
Conclusion: Objective cognitive impairment was prevalent in >40% of patients with cSLE. Impairment was strongly associated with several structural brain metrics, most of which derived from the frontal lobe and cingulate cortex. Only one disease-related factor (SDI) was found to be a relevant predictor of cognitive function. Our results suggest that computational models quantifying the relationship between brain metrics and clinical measures have the potential to enhance diagnosis of NPSLE. Further study is needed to identify robust biomarkers of NPSLE that can be linked to brain metrics with the use of machine learning models.

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Do Patients With Giant Cells Arteritis (GCA) at CHUS Hospital From 2008 to 2020 With an Increased Vascular Uptake at Fluorodeoxyglucose-positron Emission Tomography (FDG-PET) Scan Had an Higher Incidence of Aortic Complications in Comparison With the Ones With a Negative Test?

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Objectives: Primary goal was to compare the incidence of aortic complications (aneurysm, dissection, rupture) of patients with giant cells arteritis (GCA) and Takayasu vasculitis (TAK) with FDG-PET scans with an increased vascular uptake with the ones with negative tests. Secondary goals were to describe the mortality rate, aortic surgery rate and the treatments adjustments after FDG-PET scans.
Methods: This is a descriptive retrospective cohort study of all consecutive GCA and TAK cases seen in rheumatology outpatient clinic in our center, Centre Hospitalier Universitaire de Sherbrooke, from 2008 to 2021. Exclusion criteria's were : prior aortic aneurysm, dissection or surgery and absence of FDG-PET scan. We formed two groups according to if they had or not at least one FDG-PET scan showing increased vascular uptake. We compared baseline cardiovascular risk factors and treatments. Kaplan-Meier curves for aortic complication – free survival were compared with log-rank test.
Results: There was 71 cases, of which 35 had at least one positive FDG-PET and 36 hadn't. Mean age at diagnosis was 68 years. Median follow up time was 3,6 years. Baseline cardiovascular risk factors, age, CRP and erythrocyte sedimentation rate were similar between the two groups. There were 6 vs 8 aortic complications in TEP + and – groups, respectively. Complications were 13 aortic aneurysm and 1 aortic dissection, leading to 3 ascending thoracic

aorta replacement surgeries. There was no significant difference in Kaplan-Meier curves for aortic complication – free survival comparing the two groups (p = 0,488). In 112 FDG-PET scans done during follow up, having a positive vs a negative test was followed by these treatment modifications, respectively : starting prednisone in 16 vs 6 % % (mean dose 48,6 mg vs 21,3 mg); if already on prednisone : mean increase in dose of 14,6 mg vs 16,8 mg. There was no significant difference in all-cause mortality (6 % vs 13 %, p = 0,43), with a total of 6 deaths (1 atherosclerotic cardiac disease, 1 head trauma, 4 cancers).
Conclusion: Aortic complications in GCA seemed similar regardless FDG-PET scan results. Mortality rates were similar regardless of past FDG-PET results.

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Fatal Myocarditis following Immunization with a mRNA COVID-19 Vaccine in a Patient Receiving Immune Checkpoint Inhibition

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Immune checkpoint inhibitors (ICI) are being used to treat several cancer subtypes. These drugs are associated with a spectrum of immune-based toxicities referred to as immune related adverse events (irAEs). Myocarditis is a rare irAE with high mortality. Cases of myocarditis have also been reported after immunization with mRNA vaccines against SARS-CoV-2. In this report, we describe a case of fatal myocarditis in a patient who received combination ICI therapy given in close temporal proximity to the first dose of an mRNA COVID-19 vaccine.

This case involves a 52-year-old male receiving ipilimumab and nivolumab for advanced mesothelioma, who presented to hospital with symptoms of heart failure three days post cycle 2. He had received his first dose of the Pfizer-BioNTech vaccine 6 days prior to cycle 1. Upon presentation to hospital, bloodwork showed significantly elevated troponin T levels (8374 ng/L) and lactate (6.5 mmol/L). A chest x-ray showed a right sided pleural effusion and cardiomegaly. An ECG showed diffuse ST depression and ST elevation in leads V1 and V2. Following these investigations, the patient was sent for urgent coronary angiography which showed normal coronary vessels with no flow limiting lesions. An LVEDP of 25 mmHg was measured and LV angiography noted global LV dysfunction with an ejection fraction of 23%. The patient was then intubated for hypoxemic respiratory failure.

An echocardiogram showed a small pericardial effusion, with biventricular failure and a dilated right ventricle with tricuspid regurgitation. He suffered multiple PEA arrests and unfortunately died despite maximal inotropic support, mechanical ventilation, as well as resuscitative measures.

Pathology of the heart after autopsy revealed widespread myocardial necrosis and inflammation, with mixed inflammatory infiltrates and numerous multinucleated giant cells consistent with fulminant myocarditis (these findings are inferred from the attached image). The temporal proximity of the vaccine exposure to ICI initiation in this case raises a suspicion for synergetic toxicity. Although causality cannot be proven, the rapid onset and severe presentation of this patient’s myocarditis may warrant closer monitoring of patients receiving concurrent ICI therapy and mRNA vaccines.

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Precursors to Systemic Sclerosis and Systemic Lupus Erythematosus

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Objectives: There are pre-morbid clinical states such as Undifferentiated Connective Tissue Disease at risk for Systemic Sclerosis (UCTD-risk-SSc) which do not meet the scleroderma (SSc) ACR/EULAR 2013 criteria, but rather present with Raynaud's Phenomenon (RP) and either typical SSc capillaroscopic findings or serum marker antibodies. Patients diagnosed with UCTD-risk-SSc have a 35-50% risk of developing definite SSc. Moreover, prescleroderma, another entity of pre-clinical autoimmunity diagnosed in patients presenting with RP and either serum antibodies, avascular capillaroscopic changes or ANA positivity at 1:320 and avascular areas, has an even higher risk of developing SSc than UCTD-risk-SSc. Similarly, there are pre-clinical stages progressing to identifiable disease for Systemic lupus erythematous (SLE). Commonly anti-nuclear antibodies will pre-date SLE diagnosis by years during undifferentiated pre-clinical stages previously dubbed "incomplete lupus" or "lupus-like syndrome" when ACR criteria for SLE is not met. However, as disease progression occurs, more specific antibodies for SLE such as anti-double stranded DNA and anti-smith antibodies become positive. The purpose of this project is to describe the role of the innate and adaptive immune responses in the preclinical states of UCTD-risk-SSc and prescleroderma. Additionally, to discuss the evolution of SLE development as determined by antibodies predating the diagnosis and evolving from nonspecific antinuclear antibodies to specific antibodies shortly before diagnosis.
Methods: MEDLINE and EMBASE databases were searched for experimental and observational studies without language restriction from inception to the present. Reference lists of all primary studies and review articles were searched for additional references. Studies reported in full-text and abstract formats were included.
Results: Our search found 2286 studies of which 147 were included. Innate and adaptive immune pathways in pre-clinical SSc and SLE disease states encompass soluble vascular and intracellular adhesion molecules (sICAM-1, sVCAM-1), interleukins and cytokines (IL-12, IL-13, IL-35), and pro-fibrotic molecules (ANG-1, ANG-2, chitinase 3-like protein). Fibroblast dysfunction and pro-fibrotic gene expression is observed in dormant fibroblasts activation through macrophage induction by factors such as MyD88. Additionally, loss of invariant natural killer T cells is associated with decreased tolerance to nuclear antigens.
Conclusion: Ultimately, derangements in innate and adaptive immunity, as well as the dysregulation of inflammatory signal pathways have been observed to drive pathology in these pre-clinical stages with varying likelihood of progression to full-blown disease.

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Identifying Lupus Flares from Electronic Clinical Notes in a Linked EMR-Claims Dataset

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Objectives: Although algorithms have attempted to identify systemic lupus erythematosus (SLE) flares using large medical and pharmacy claims databases1 they have not been clinically validated. Important diagnostic information may not be available in structured data due to omission of details with common coding practices,2 leading to potential false negative classifications. Unstructured medical notes may provide the additional detail needed to accurately identify and classify a flare event. The purpose of this research was to explore the feasibility of using written clinical notes to identify flare episodes in patients with SLE.

Methods: A linked dataset of ambulatory electronic medical records (EMR) and administrative claims was used to identify SLE patients who had newly initiated selected immunosuppressants or advanced therapies. Adult patients were included if they had an index medication between 01 July 2015 and 30 June 2019 with a diagnosis of SLE on or before the date of therapy initiation. Natural language processing (NLP) was used to identify key flare-related words or phrases from visit-level, unstructured, electronic clinical notes and to assist in developing rules to categorize notes. Three clinicians reviewed and classified the notes as indicative of a high-confidence flare, a probable flare, or not a flare. Fleiss kappa coefficient was calculated to determine inter-rater reliability on a random sample of notes. Time to first flare (if any) after initiation of the immunosuppressant was determined.
Results: Among 801 eligible patients, 21.6% had initiated azathioprine, 11.0% belimumab, 35.2% methotrexate, and 32.2% mycophenolate. Of these 20% were identified as having at least one high-confidence or probable flare during the 12 months after initiation of immunosuppressant (azathioprine 23.1%, belimumab 19.3%, methotrexate 22.3%, mycophenolate 15.5%). Inter rater agreement (Fleiss Kappa = 0.68) was substantial. Among patients with a post-index flare the mean time to flare was 100.9 days (azathioprine 127.6 days, belimumab 158.4 days, methotrexate 67.6 days, mycophenolate 102.1 days).
Conclusion: NLP combined with clinical review of unstructured notes was demonstrated to be a feasible approach to identifying SLE flares in a large EMR database. These results will be applied to a treatment and resource utilization study. Future work will investigate concordance between NLP and structured data approaches, and development of a machine learning algorithm for flare identification and severity.

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Management of TMJ Arthritis; Eminence or Evidence

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Objectives: The temporomandibular joint (TMJ) is often affected in children with Juvenile Idiopathic Arthritis (JIA), with occurrence varying widely depending on factors like JIA type, diagnostic approaches, and study population. [1] Inflammation in the TMJs can result in joint deformity, dysfunction, and substantial morbidity in the pediatric arthritis population. [2] Management of TMJ arthritis is difficult due to the uniqueness of the joint, and requires multidisciplinary care. This study will aim to develop management recommendations based on expert consensus for TMJ arthritis in JIA by involving members of TMJaw and the Childhood Arthritis and Rheumatology Research Alliance (CARRA) TMJ interest group.
Methods: A scoping review of the literature was conducted until April 2021. Studies were deemed eligible if they met the following criteria: 1) treatment reported, 2) pediatric population, 3) disease of interest, TMJ arthritis in JIA, 4) ³4 patients, 5) human studies, 6) English articles, 7) original research, and 8) full length articles. Studies were screened by reviewing titles and abstracts for relative content. Article quality was assessed using a modified version of Pasma et al. Quality Assessment Tool. [3] Questions addressed patient recruitment through sampling method, participation, treatment and outcome measurements, and conflict declaration. Non-relevant questions were dropped from the tool. Three questions were deemed essential and a score of 1 was given to each question upon satisfaction. A study with a total score of 4 or higher and at least 2 of 3 essential questions was considered high-quality. Information on design,

sample size, and patient demographics, management strategies and outcomes were aggregated. Management and outcomes were analyzed and discussed among TMJaw members and the CARRA TMJ interest group working group to suggest management recommendations.
Results: Of the 63 articles selected for full-text review, 15 articles were deemed high-quality from the fields of: dentistry (n=1), imaging analysis and stereology (n=3), rheumatology (n=3), orthodontics (n=5) and oral maxillofacial surgery (n=3). No trials were available and therefore no meta-analysis was possible. Extrapolated evidence suggests that a multidisciplinary approach to care is necessary for diagnosis, interception, and management. Intervention with an orthodontic/orthopedic appliance may provide symptom relief and can minimize or correct developing deformity. Intraarticular TMJ injections generally result in symptom relief but may negatively influence TMJ growth and cause heterotopic bone formation. Joint reconstruction corrects dentofacial deformity and improves function when necessary.
Conclusion: Early diagnosis, monitoring, and treatment is necessary to reduce potential morbidity of TMJ arthritis. A multidisciplinary approach is recommended.

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A Tale of Many Canadas: The Interplay of Ethnicity and Geographic Region as Modifiers of the Presentation to Care in Children With Juvenile Arthritis in Canada

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Objectives: To describe the relative proportion of juvenile idiopathic arthritis (JIA) disease categories, time from symptom onset to diagnosis and disease activity at presentation across major ethnic groupings and geographic regions in Canada.
Methods: Using data from 1479 participants in the Research in Arthritis in Canadian Children emphasizing Outcomes (ReACCh-Out) cohort study (children newly diagnosed with JIA between 2005-2010), we compared the relative proportion of JIA categories, weeks from first symptom onset to diagnosis and the clinical Juvenile Arthritis Disease Activity Score (cJADAS10) scores (range from 0-30, including up to 10 active joints) across geographic regions and self-identified ethnic groups. Regions included British Columbia (BC), Prairies (Alberta, Saskatchewan, Manitoba), Ontario, Quebec, and Maritimes (New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador). Ethnicity was analyzed per Statistics Canada groupings. We used chi-square tests and Kruskal-Wallis tests to identify statistically significant differences with a $P<0.05$.
Results: There were significant differences in JIA categories across Canadian regions ($p<0.001$), oligoarthritis was most frequent in Quebec (51.4%) and least frequent in the Maritimes (27.6%);

enthesitis related arthritis most frequent in BC (19.1%) and least frequent in Quebec (10.9%) (Table 1). Participants who self-identified solely as French had a different distribution of JIA categories relative to those self-identified solely as British. Participants who self-identified solely as Indigenous had the highest frequency of RF-positive polyarthritis (21.2%) of all ethnic groups. There were significant regional differences in time from symptom onset to diagnosis ($p= 0.01$), from a mean of 36.7 weeks in Quebec, to a mean of 44.5 weeks in the Maritimes; and from 24.9 weeks among participants self-identified solely as South Asian, to 93.4 weeks among participants self-identified solely as Latin American. Participants who self-identified solely as Indigenous had an average of 25.9 weeks from symptom onset to diagnosis. The mean cJADAS10 score varied from 7.3 in Quebec, to 10 in the Maritimes; and from 5.9 in participants who self-identified solely as Latin American, to 11.7 in those self-identified solely as Indigenous. There were also significant differences in cJADAS10 scores across JIA categories ($p<0.001$), with a mean of 5.4 in oligoarthritis and 16.3 in polyarthritis RF-positive.
Conclusion: In this cohort, children with JIA across Canada had substantial differences in the distribution of JIA categories, time from onset to diagnosis and disease activity at presentation across Canadian regions and self-identified ethnicities. These differences should be accounted for in any comparisons of JIA treatments and outcomes across the country.

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How has the COVID-19 Pandemic Changed Care for Children with Rheumatic Diseases? A Family-Based Survey Study

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Objectives: To investigate changes to pediatric rheumatology healthcare delivery during the COVID-19 pandemic.
Methods: An anonymous survey was developed for online completion by patients and their families attending clinic visits at BC Children's Hospital (BCCH) Rheumatology Clinics from July-September 2021. The BCCH clinics care for children from the entire province of BC. The survey asks about the potential impact of the pandemic on pediatric rheumatic care, survey domains include 1) how the child's diagnosis affects family concern about COVID-19; 2) how the child's treatment and disease management has been affected; 3) how child and family mental health and security has been impacted. Patient demographic information was collected. Children aged 9-18 years were also asked to complete a modified version of the Pediatric Quality of Life Inventory Generic Core questionnaire, with an additional item asking if there was increased, decreased, or no change during the pandemic. Analysis is descriptive.
Results: Survey responses were obtained from 97 patients (60% female) and their families. A majority of parents (54%) reported moderate-extreme increase in concern about COVID-19 because of their child's disease or treatments. Many families reported a decrease of in-person clinical visits (42%), and a concurrent increase in virtual clinic visits (37%) (Table 1). These trends were less prominent in families living in the Greater Vancouver Area (30% more virtual visits and 34% less in-person visits) compared to those living in other BC regions (57% more virtual visits and 67% less in-person visits). A small number of families (17%) experienced difficulty in obtaining their medications and 30 (31%) reported limited access to healthcare due to a change or loss in employment, transportation issues, or a change in residence. 24 (40%)

children and youth reported an increase in emotional health concerns. Of those children and/or parents eligible for a COVID-19 vaccine, 26 (28%) had not received it; of those, 14 (54%) stated they do not plan to get the vaccine or are unsure.
Conclusion: Pediatric rheumatology care in BC was significantly affected by the COVID-19 pandemic. Family concern about the pandemic related to their child's disease is high and families have reported limitations in access to healthcare due to personal circumstances. Children and youth also report an increase in mental health concerns related to COVID-19. Children with rheumatic diseases and their families require increased services and emotional support due to pandemic disruptions.

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Self-reported Transition Readiness of Adolescent Patients with Rheumatologic Disease: Do the Parents Agree?

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Objectives: The transition from pediatric to adult rheumatology care is associated with increased disease activity and morbidity. The parent-child relationship is a significant relationship in the transition journey and parents play a key role in promoting self-management skills in adolescent patients. Assessing both adolescents' and parents' perception of the adolescent's independence and self-management skills are important to identifying discordant views and developing strategies to improve transition. Thus, we compared transition readiness assessment scales from both perspectives and analyzed their level of agreement.
Methods: Adolescents aged 14-18 years old with JIA or jSLE and their parents were recruited in our multidisciplinary rheumatology transition clinic. The patient and one parent both independently completed the TRANSITION-Q during clinic appointments. The TRANSITION-Q is a 14-item, validated, self-administered questionnaire assessing healthcare self-management skills where higher scores (max. 100) indicate greater transition readiness. Total scores and frequencies of responses to each question ("never", "sometimes" or "always") were recorded and the proportion of agreement between their responses were determined. Pearson correlation analyses determined the correlation between adolescent and parent total transition scores and agreement was analyzed using a Bland-Altman plot.
Results: Among 57 patient/parent dyads, the Pearson correlation coefficient between parents' and adolescents' total scores was 0.71 ($p<0.001$). Bland-Altman analysis illustrated generally good agreement with a mean difference of 1.2 which indicates a slight underestimation of parental scores compared to patient scores. For each question, dyads agreed an average of 70% of the time. The majority of disagreement was mild (i.e. sometimes/always or sometimes/never). Most frequent disagreements pertained to adolescents' discussion with people about their health condition and asking questions regarding their health. Extreme disagreements (i.e. always/never) were rare and only occurred 7% of the time in relation to whether adolescents contact the doctor when they need to, and 9% of the time in relation to seeing the doctor/nurse on their own.
Conclusion: Adolescents and parents generally agree on the level of the adolescent's transition readiness, however there is occasional disagreement in specific domains. Identifying items more prone to disagreement can help identify areas to target future interventions to improve self-

management skills in adolescent patients and successful transition to adult care.

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Transition Readiness Before Versus After Adolescents With Rheumatic Disease Transition to Adult Care

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Objectives: The transition from pediatric to adult rheumatology care is associated with increased disease activity and morbidity. Consequently, there has been increasing focus on transitional programs involving multidisciplinary teams to improve self-management skills and other transition-related outcomes. Unfortunately, there is a lack of research surrounding the final stage of transition that occurs immediately after the patient transitions to adult care. Thus, our study aimed to better characterize transition readiness and assess how transition readiness may compare pre-transfer to adult care to post-transfer in a cohort of young adults who were seen in a multidisciplinary rheumatology transition program.

Methods: Adolescents aged 17-18 years old with juvenile idiopathic arthritis (JIA) or juvenile onset systemic lupus erythematosus (jSLE) were recruited in our multidisciplinary pediatric rheumatology transition clinic and followed after they transitioned to adult care at age 18 years. Upon transfer to adult care, young adult patients are seen by an adult rheumatologist and an Advanced Clinical Practitioner in Arthritis Care (ACPAC) physiotherapist who sets goals and coaches patients on self-management skills and strategies. Prior to and after the transfer to adult care, all patients completed the TRANSITION-Q, a 14-item, validated, self-administered questionnaire assessing healthcare self-management skills where higher scores (max. 100) indicate greater transition readiness. Total scores and frequencies of responses to each question ("never", "sometimes" or "always") were recorded and changes in scores were assessed.

Results: Thus far, 15 patients have participated (n=13 female, 87%) of whom 67% have JIA. The mean (SD) TRANSITION-Q score prior to transition to adult care was 67.7 (15.2) compared to 82.9 (17.0) after transfer. TRANSITION-Q scores increased in 14/15 (93%) of patients. Individual domains in which the greatest number of patients (53-60%) improved pertained to traveling to doctors appointments on their own, contacting the doctor when they need to, booking their own doctor's appointments, and seeing the doctor on their own during appointments.

Conclusion: Young adult patients with pediatric-onset rheumatic disease who were seen as adolescents in our multidisciplinary transition clinic show improved self-management skills after transitioning to adult care as measured by improved TRANSITION-Q scores. The reasons for improvement are likely multifactorial and related to our transition program, patient maturation and the involvement of an ACPAC after transfer to adult care. Future work will involve increasing our sample size and comparing with patients who did not have access to an ACPAC after transfer.

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Physician Perception of Ambulatory Rheumatology Care Using Telemedicine During a Global Pandemic

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Objectives: The COVID-19 pandemic has been a catalyst to widespread uptake of telemedicine

in ambulatory rheumatology care. In Canada, across British Columbia (BC), health authorities encouraged rheumatologists to provide care using telemedicine, including both telephone and video-based platforms, in place of traditional in-person visits when possible. Our aim was to assess how telemedicine has impacted BC rheumatologists' clinical care, relationships with patients, and ambulatory practice processes including administrative workload for both physicians and support staff.
Methods: A survey was created and distributed to all adult rheumatologists in BC. Data collected included both quantifiable metrics and qualitative data from free text answers. One-way ANOVA with post-hoc Bonferroni analysis was used for parametric data, and independent samples Kruskall-Wallis test was used for non-parametric data.
Results: Of the 85 practicing rheumatologists in BC, 38 (45%) responded to the survey. The majority (76%) of respondents agreed or strongly agreed that history was adequate via telemedicine. This differed significantly based on years in practice, with a higher percentage of those in the first 4 years of practice in agreement when compared with those with 11 or more years in practice. The majority (86%) of respondents disagreed or strongly disagreed that a physical examination performed by telemedicine was adequate. When respondents were asked to agree or disagree with statements regarding adequacy of history, physical examination, diagnosis and treatment of common rheumatologic conditions (gout, inflammatory arthritis, systemic lupus erythematosus, vasculitis, positive serology without rheumatologic disease, non-inflammatory musculoskeletal conditions and other connective tissue diseases), the percentage of respondents in agreement differed based on the condition. The mean percentage of instances where patients required a subsequent in-person appointment because telemedicine was felt to be inadequate was 25%. The majority (69%) of respondents agreed or strongly agreed that patient satisfaction was high using telemedicine and 94% felt they could effectively communicate with patients. The majority (57%) felt workload was unchanged using telemedicine. Respondents stated that they planned to conduct a mean of 46% of future appointments via telemedicine, with the most common reasons being for patients in rural locations, those with physical limitations and those who find telemedicine more convenient.
Conclusion: Our data suggests that rheumatologists are satisfied with the history obtained from telemedicine. However, solutions to facilitate an adequate physical exam remain an area to be explored. Workload is not significantly increased and rheumatologists plan to continue using telemedicine beyond the pandemic.

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Anakinra Treatment of Multisystem Inflammatory Syndrome in an Adult (MIS-A) with Fulminant Myocarditis Following COVID-19 Infection and mRNA Vaccination: A Case Report and Literature Review.

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Objective: Multisystem Inflammatory Syndrome in Adults (MIS-A) is a novel syndrome that has emerged during the COVID-19 pandemic. It is related to its pediatric counterpart, MIS-C, which shares features of Kawasaki Disease and Toxic Shock Syndrome. There is no clear consensus on treatment of these novel syndromes, however case reports have described success with IVIg, glucocorticoids and biologics, including tocilizumab and anakinra. Although mRNA vaccines are considered safe and effective against COVID-19, myocarditis has been reported after vaccination in young adults. We report a case of MIS-A and fulminant myocarditis following asymptomatic COVID-19 infection and mRNA vaccine (Moderna), with clinical

response to anakinra.
Methods: A case report and literature review on treatment of MIS-A and myocarditis are presented.
Results: A previously healthy, 21-year-old Haitian Canadian female received an mRNA vaccine 28 days following an asymptomatic COVID-19 (B.1.1.7 variant) infection. She presented to emergency 17 days post-vaccine with a 7-day history of nausea, vomiting, headache, rash, arthritis, fever, chest pain and dyspnea. She took prednisone 50 mg x 5 days prior to admission. Labs revealed WBC 17.7, CRP 315.5, ferritin 668, NT-proBNP 1641, TnT 808, and normal serology (ANA, RF, C3, C4). She was admitted to ICU for cardiogenic shock secondary to myocarditis and received IV vasopressors, heparin, IVIg 2 gm/kg and pulse methylprednisolone. Her ejection fraction decreased to <5% (NT-proBNP 27,699) and she was moved to CV-ICU for ECMO. She received anakinra 100 mg IV BID, titrated up to q6h the following day. After 7 days of biologic therapy, she was extubated and taken off ECMO. The anakinra was tapered off over 1 week (14 days total), with normalization of cardiac function. Her course was complicated by cardioembolic left cerebellar, pontine and mid brain stroke, thrombosed right common femoral artery secondary to ECMO, and polyneuropathy requiring extensive rehabilitation.
Conclusions: There is a growing body of literature supporting treatment of MIS-A and myocarditis with IL-1 antagonist therapy. This is the first report of a vaccine-related MIS-A/myocarditis treated with IL-1 antagonist therapy that we are aware of. Advantages of anakinra over tocilizumab may include safety (lower risk of infection and leukopenia, shorter t ½) and efficacy in idiopathic myocarditis. Also, anakinra does not blunt CRP and ferritin levels which are useful disease activity markers. More evidence is needed to support a consensus on the treatment of MIS-A. Finally, this case raises questions concerning the safe timing of mRNA vaccination after COVID-19 infection.

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Bilateral Lipoma Arborescens in a Patient With Crohn's Disease: A Diagnostic and Treatment Dilemma

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Lipoma arborescens (LA) is a rare intra-articular disorder of the synovium. It is characterized by lipomatous proliferation of the synovial tissue and presents clinically with progressive and recurrent joint effusions. These benign tumors are most commonly found in the knee and can be painful or painless. Diagnosis is made via MRI or synovial biopsy. We report a rare case of bilateral LA and the first case of LA reported in a patient with history of IBD. The case is also valuable because it delineates the difficulties in diagnosing and treating LA.

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Transient Perivascular Inflammation of the Carotid Artery (TIPIC) Syndrome: A Precursor to Giant Cell Arteritis?

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Case Descriptions: An 84-year-old male presented with a 2-day history of right-sided neck pain with no constitutional symptoms, headaches, or vision changes. His C-reactive protein (CRP) was 155 mg/L. CT scan showed perivascular inflammation (PVI) around the right common carotid artery with extension. Temporal artery biopsy was negative. He was started on high-dose prednisone with rapid resolution of pain. His prednisone was tapered and his CRP

normalized. CT imaging 3 weeks later showed complete resolution of the PVI, consistent with TIPIC syndrome. There were never signs of large vessel vasculitis (LVV) on imaging. Approximately 1 month later, he developed a temporal headache and his inflammatory markers rose. He was diagnosed with giant cell arteritis (GCA) and his prednisone dose was increased with resolution of the headache. He was weaned off prednisone without the use of steroid-sparing therapies and remains in remission.

Another 68-year-old male presented with repeated short episodes of neck pain that self-resolved. He described associated earache and sore throat. He ultimately presented during an episode with CRP 100.1 mg/L and ESR 97 mm/hr. CT scan showed PVI around the right common and internal carotid arteries with no other vascular changes. He was treated with aspirin. Two weeks later, CT showed shrinkage of the PVI. The PVI resolved 6 months later, consistent with TIPIC. Eighteen months later, he developed neck pain, pleuritic chest pain and right foot synovitis with an elevated CRP. He now had CT evidence of LVV affecting large arteries in the chest, pelvis and lower extremities. He was started on high dose prednisone with good response and began tocilizumab 1 month later.

Discussion: TIPIC syndrome is a poorly known condition that has recently gained attention. TIPIC causes acute neck pain and pericarotid inflammation on imaging. NSAIDs and aspirin are both proposed treatments. TIPIC may be a form of vasculitis. This is supported by increased glucose uptake by the PVI in FDG-PET CT scans, which is also seen in affected areas of LVV. Furthermore, patients with vasculitis have increased levels of s-intracellular adhesion molecule-1 (sICAM-1), a molecule used to support the inflammatory response. Patients with TIPIC also have elevated levels of sICAM-1, suggesting similar pro-inflammatory pathways.

Conclusions: We propose that TIPIC syndrome acted as a precursor to GCA in our patient cases, heralding more significant disease akin to palindromic rheumatism and rheumatoid arthritis. To our knowledge, there is no existing report of this nature in the literature.

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Nailfold Videocapillaroscopy Alterations in Idiopathic Inflammatory Myopathies: A Prospective Study

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Objectives: Nailfold videocapillaroscopy (NVC) alterations have been described in idiopathic inflammatory myopathies (IIM) classified using Bohan and Peter criteria. The aim of this study was to describe NVC abnormalities in IIM subsets using updated sero-clinico-pathological integrated criteria and to determine change in response to treatment.

Methods: We studied IIM subjects in the Canadian Inflammatory Myopathy Study (CIMS), an early onset cohort followed prospectively. NVC images were acquired using the DS MEDICA Videocap (X200 magnification). The nailfolds of the second, third, fourth and fifth fingers of both hands were photographed and scored by an experienced rheumatologist. Microhemorrhages, giant capillaries, ectasias and ramified capillaries were scored using a standardized semi-quantitative scale (0 = no, 1 = ≤33%, 2= 33–66%, and 3 = ≥66% abnormalities per linear millimeter). Capillary density was scored semi-quantitatively (0 if ≥7, 1 if 4–6, or 2 if ≤3 capillaries/mm) and quantitatively (mean number of capillaries/mm). Each NVC parameter, as well as giant-ramified capillaries, were scored as present or absent. Finally, the proportion of

subjects with scleroderma (SSc), SSc-like, non-specific, and normal patterns were compared.
Results: Thirty-nine patients were included: 22 dermatomyositis (DM), 8 anti-synthetase syndrome (ASS), and 9 scleromyositis (SM). Baseline capillaroscopy revealed decreased capillary density in DM (mean 5.55/mm) and SM (mean 5.50/mm), while ASS were normal (mean 7.15/mm). Ectasias were common at baseline in DM (87%) and SM (100%) patients, while only 50% ASS patients had this finding. Ramified capillaries were also common at baseline, seen in 86.4% DM, 62.5% ASS, and 88.9% SM patients. Giant capillaries were seen in 66.7% SM, but only 45.5% DM, and 37.5% ASS patients. Baseline NVC patterns in DM were more commonly SSc-like (36.4%) or nonspecific (36.4%), while 50% ASS were normal, and 66.7 % SM were SSc-like. At follow-up, all capillaroscopy abnormalities in DM improved, except ramified capillaries which increased (Table 1). Capillaroscopy abnormalities also improved in ASS, except ramified and ectasias, which increased, while in SM there was no improvement.
Conclusion: This is the first study of NVC using integrated criteria for IIM. Although ASS and SM are often classified together as overlap myositis, these findings highlight NVC differences between these two subsets, suggesting that NVC can refine IIM phenotyping. Treatment may improve capillaroscopy abnormalities in DM and ASS but not in SM. NVC might be a potential biomarker for disease monitoring in certain IIM subsets.

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A Survey of Treatment Satisfaction with Intravenous Immunoglobulin Among Patients with Inflammatory Myositis

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Objectives: Intravenous Immunoglobulin (IVIg) is used to treat rheumatic conditions such as Inflammatory Myositis. Home-based subcutaneous Immunoglobulin (SCIg) is an alternative route of administering Immunoglobulin that is cost-effective with similar outcomes and less adverse events. Our objective was to characterize patient satisfaction regarding IVIg treatment of their myositis, and to explore their perceptions of SCIg and interest in transitioning to SCIg.
Methods: Adult patients (age 18+) receiving IVIg for Inflammatory Myositis at a Tertiary Centre in Ottawa were approached and provided informed consent to participate. An adaptation of the validated Treatment Satisfaction Questionnaire for Medication was administered to collect data on patient satisfaction across 4 domains (effectiveness, convenience, side effect burden, and global satisfaction) and to gauge interest in SCIg. Data was collected using a 5 or 7-point Likert scale. Results were anonymized and summarized descriptively with means reported. Ethics approval was obtained from the Ottawa Health Science Network Research Ethics Board.
Results: 9 patients responded to our survey. Indications for IVIg included Dermatomyositis (55.6%), Polymyositis (11.1%), Anti-Synthetase Syndrome (11.1%), and other Inflammatory Myositis (22.2%). 55.6% of participants had received IVIg for more than 3 years, 33.3% for less than 1 year, and 11.1% for 1-3 years. On average, participants were satisfied with the effectiveness of IVIg (5.8/7) but somewhat dissatisfied with the overall convenience (4.4/7). 88.9% of participants reported side effects including headache (77.8%), fatigue (33.3%), nausea (33.3%), chills (22.2%), cramps (11.1%), and minor chest pain (11.1%). Side effects were rated as neutral to somewhat bothersome. Overall, participants were satisfied with their experience (5.1/7). Scores across all 4 domains were similar regardless of diagnosis or treatment duration. 88.9% of participants were unfamiliar with SCIg. Participants were somewhat uncomfortable

with the idea of SCIg (4.1/7) with 33.3% citing lack of knowledge. 44.4% were willing to switch to SCIg, 11.1% were not, and 44.4% were unsure. Those willing to switch had on average received IVIg for a shorter duration.
Conclusion: Participants were satisfied with the effectiveness of IVIg in treating their myositis but somewhat dissatisfied with the inconvenience and side effect burden. This discrepancy has been reported in other diseases treated with IVIg, with the inconvenience being attributed to the frequency and duration of infusions. SCIg may offer a solution to this, though unfamiliarity is a barrier to patient buy-in. Further patient education on SCIg, as well as larger controlled studies to validate its use in Inflammatory Myositis, are required.

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Understanding Perceived Barriers and Facilitators to Engaging in Care for Knee Osteoarthritis in Persons with Type 2 Diabetes Mellitus: A Qualitative Study Using the Theoretical Domains Framework

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Objectives: Symptomatic knee osteoarthritis (OA) frequently co-occurs in individuals with type 2 diabetes mellitus (T2DM) and may lead to worse T2DM outcomes, yet it remains undertreated. Studies suggest health care providers often assign OA a lower priority relative to other chronic conditions like T2DM, but there is no published literature on barriers and facilitators to OA care from the perspectives of persons living with T2DM. With view to developing an intervention to improve both diagnosis and treatment of knee OA in persons with T2DM, we sought to understand the perceived barriers and enablers to the behaviour of seeking and engaging in knee OA care in persons with T2DM.
Methods: We conducted semi-structured telephone interviews with 18 individuals with a physician diagnosis of T2DM and symptomatic knee OA recruited from an urban family medicine practice and the Arthritis Society rehabilitation program in Ontario, Canada. Recruitment was guided by saturation of themes. Transcripts were deductively coded using the Theoretical Domains Framework (TDF), an implementation science framework that incorporates a range of theoretical constructs to comprehensively identify determinants of behaviour which can be mapped systematically to behaviour change techniques. Within each of the 14 TDF domains, data were thematically analyzed to generate belief statements.
Results: Of the 18 individuals interviewed, nine (50%) were women, nine (50%) were over the age of 70 years, and 9 (50%) had been diagnosed with T2DM more than 10 years prior. Mean WOMAC pain was 8.17/20 (SD 4.84) and 13 (72%) had at least "some difficulty" walking outdoors on flat ground due to their OA. Seven of the TDF domains were identified to prominently influence the behaviour to seek and engage in OA care: knowledge, beliefs about capabilities, reinforcement, environmental context and resources, social influences, and behavioural regulation. Belief statements constructed within these domains are presented in Table 1. Important barriers include insufficient OA knowledge to fully engage in care (knowledge), feeling incapable of participating in physical activity/exercise due to joint pain (beliefs about capabilities), lack of guidance from health care providers and insufficient access to community programs/supports (environmental context and resources). Key facilitators were strong social support (social influences) and sources of accountability (behavioural regulation).

Concomitant T2DM was not seen to limit engagement in OA care.
Conclusion: Among individuals with symptomatic knee OA and T2DM, we identified multiple barriers and facilitators to seeking and engaging in knee OA that will be used in developing an implementation intervention.

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Understanding Barriers and Facilitators to Health Care Providers Assessing and Treating Knee Osteoarthritis in Persons with Type 2 Diabetes Mellitus: A Qualitative Study Using the Theoretical Domains Framework

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Objectives: Symptomatic knee osteoarthritis (OA) commonly co-exists in persons with Type 2 diabetes (T2DM) and, if left untreated, may impede diabetes self-management, including engaging in physical activity. Evidence-based therapies for OA are underutilized. Studies suggest heath care providers may pay less attention to diagnosis and management of OA in the context of other competing chronic conditions. To inform the development of an implementation intervention to improve guideline-concordant management of symptomatic knee OA in persons with T2DM, we examined the perspectives of diabetes health care providers regarding barriers and enablers to diagnosing and treating knee OA in persons with T2DM.
Methods: We conducted 18 semi-structured telephone interviews with healthcare providers who treat persons with T2DM (family physicians, endocrinologists, and diabetes educators) purposefully selected to represent a range of practice settings and years of experience. Recruitment was guided by saturation of themes. Transcripts were deductively coded using the Theoretical Domains Framework (TDF), an implementation science framework that incorporates a range of theoretical constructs to comprehensively identify determinants of behaviour which can be mapped systematically to behaviour change techniques. Within each of the 14 TDF domains, data were thematically analyzed to generate belief statements. We then compared represented domains and belief statements across the different health care providers.
Results: Eighteen providers were interviewed (8 endocrinologists, 7 family physicians, 3 diabetes educators). Of the 14 TDF domains, 6 were featured prominently in the interviews: knowledge, skills, professional role and identity, intentions, environmental context and resources, and social influences. Belief statements within these domains are presented in Table 1. For all health care providers, important barriers include not seeing joint pain as a priority (intention), and the perceived insufficient supports that are available to refer to (environmental context and resources). As seen in Table 1, compared to family physicians, endocrinologists and diabetes educators perceived having less sufficient knowledge and skills to assess OA (knowledge, skills), did not consider it within their professional role to address OA (professional role and identity), and perceived other physicians would not want to receive a referral for OA care (social influences).
Conclusion: Using the TDF, we identified several domains that featured prominently in health care providers' behaviour of assessing and treating knee OA in persons with T2DM. These will guide the development of a complex intervention to address the deleterious impact of underdiagnosed and undertreated knee OA on T2DM management.

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A Case of Rhabdomyolysis Following Vaccination Against COVID-19 in a Patient with Pathogenic Ryanodine Receptor Gene Variant

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Background: Rhabdomyolysis has a broad range of etiologies, and the rheumatologist may be expected to exclude immune-mediated myopathies as a cause. We herein present a case of rhabdomyolysis following COVID-19 vaccination in a patient with ryanodine receptor (RYR1) gene mutation.

Case Summary: A 30-year-old female presented to hospital with progressive bilateral upper and lower extremity myalgia and weakness, starting 3 days after second dose of Moderna COVID-19 vaccine. She has known pathologic RYR1 gene mutation at the canonical splice site (c.12624+1_124+2insT), with 5 prior episodes of rhabdomyolysis, most triggered by viral infections. Medical history included schizoaffective disorder, latent tuberculosis treated 5 years prior, polycystic ovarian syndrome, iron deficiency anemia, and obstructive sleep apnea. Medications included atorvastatin, clozapine, lithium, flupentixol, ferrous gluconate, and vitamin D. There was no recent strenuous exercise, trauma, prolonged exposure to heat, alcohol or recreational drug consumption, or sick contacts. Review of systems revealed flu-like symptoms 1 day after vaccination, resolving within 2 days, but otherwise negative for connective tissue disease, mucocutaneous, cardiovascular, respiratory, gastrointestinal, neurologic, or additional musculoskeletal abnormalities. Physical examination was notable for symmetric 4/5 strength globally, with normal mental status, tone, reflexes, joints, and skin.

Investigations (Table 1) demonstrated initial CK of 203,088 U/L and AST greater than ALT elevation. Creatinine, urea, electrolytes, albumin, glucose, venous blood gas, lactate, and complete blood count were normal except for mild hypokalemia and mild hyperphosphatemia. Urinalysis revealed no protein, and 3+ blood. ANA, pANCA, cANCA, Anti-HMGCR, and 15 antibody myositis panel were negative. Thigh MRI revealed diffusely heterogenous symmetric intramuscular and intermuscular edema.

Upon presenting 8 days post-vaccination, she received aggressive intravenous fluids, and oral dantrolene 25mg TID. Atorvastatin was discontinued. Her myalgia and weakness initially worsened, with peak CK at 586,647 U/L 11 days post-vaccination. Rheumatology was consulted to exclude inflammatory myopathy, particularly given statin exposure for 2 years. By day 14 post-vaccination, the patient began improving clinically with normalization of CK 1 month post discharge, without receiving immunosuppressive therapy.

Conclusion: In summary, we present a case of severe rhabdomyolysis without evidence of immune-mediated myopathy. Other diagnostic considerations such as malignant hyperthermia, or neuroleptic malignant syndrome, were not clinically compatible. Given the close temporal relationship, we hypothesize that COVID-19 vaccination likely triggered an inflammatory response that precipitated rhabdomyolysis in this patient who was susceptible due to an underlying pathogenic RYR1 gene mutation, with concomitant risk factors including statin and antipsychotic drug exposure.

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JIA Polyarthritis as a Misdiagnosis for Farber Disease: A Case Report

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Background: Farber disease is an ultra-rare lysosomal storage disease caused by mutations in the *ASAH1* gene. The resulting deficiency of the acid ceramidase enzyme leads to accumulation of the pro-inflammatory sphingolipid ceramide. Three cardinal symptoms of Farber disease include joint disease (polyarticular arthritis and contractures), subcutaneous nodules, and a hoarse voice. There is a broad spectrum of severity with classic disease presenting in infancy and attenuated forms that may not be recognized until adulthood. In this report we describe a patient diagnosed with JIA prior to the diagnosis of Farber disease through genetic testing.
Case: A one-year-old boy of Syrian descent was referred to the rheumatology clinic for progressive pain and stiffness in his hands over the preceding 6 months. There was no history of fever or rash. He was born full-term, had normal growth and no known health problems. The family described a gross motor delay attributed to pain when using his hands. Family history was negative for rheumatological diagnoses. Consanguinity through great-grandparents was later reported. The physical exam revealed painful joint contractures in his fingers, wrists, knees, hips, ankles, and elbows, with joint swelling in his first toes, wrists, second and third MCP joints, and thumbs. He had one small nodule on the dorsal aspect of a finger. The remainder of the physical exam was normal. Preliminary testing revealed a normal CBC and CRP and negative ANA and RF. X-rays of the joints did not reveal any bone changes. Ophthalmology exam and a mucopolysaccharidosis screen were normal. He was diagnosed with RF negative JIA polyarthritis and started on naproxen and methotrexate. His parents reported a good response to naproxen with improved mobility and pain reduction, however nodules and joint disease progressed. Subsequent genetic testing identified a homozygous mutation in the *ASAH1* gene consistent with a diagnosis of Farber disease. The patient is now 4 years old and has developed voice hoarseness and more significant developmental delay over time. Methotrexate was discontinued and he is now receiving tocilizumab without a clear response. Due to poor feeding, a g-tube is being considered.
Conclusion: There is no cure for Farber disease and current treatment strategies including DMARDs and hematopoietic stem cell transplantation have significant limitations. The diagnosis should be considered in patients with chronic joint contractures who also develop subcutaneous nodules, neurologic symptoms, or dysphonia, or fail to respond to standard arthritis treatments. Future treatments options may include enzyme replacement or gene therapy.

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Epidemiology of Musculoskeletal Manifestations in Paediatric Inflammatory Bowel Disease: A Systematic Review

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Objectives: Paediatric inflammatory bowel disease (p-IBD) is a chronic and relapsing gastrointestinal disorder of childhood with associated long-term morbidity. Several extraintestinal manifestations (EIMs) are described, the most common being joint pain and/or inflammation. In 1986, Passo et al. were the first to describe the association of arthritis in p-IBD patients. However, since then, data on the epidemiology, patient and disease factors associated with, treatments for, and outcomes of p-IBD associated musculoskeletal (MSK) disease are not well-established. Our study aims to summarize the literature on the epidemiology of MSK EIMs in p-IBD in the era of biologics.
Methods: A systematic review of the literature was performed. PubMed, Embase, Cochrane

Library, Web of Science Core Collection, and CINAHL databases were searched with relevant keywords. Studies in English published from January 1, 2000 to December 21, 2020 were included. In total, 3893 papers were identified and screening was performed by two independent reviewers (AA, MS). Conflicts were resolved by a third reviewer (EC, RB). Study and population characteristics were recorded. The primary outcomes of interest were MSK symptoms at presentation and their course, method of diagnosis and definitions used for MSK EIMs. Risk of bias assessment was performed using the JBI Critical Appraisal Tools.
Results: Thirteen studies were included for full review, which were primarily single-centre observational studies with retrospective or cross-sectional design. The method of diagnosis for MSK EIMs varied across the studies, with only 4 studies stating the involvement of a rheumatologist in diagnosis. The definitions also varied, with MSK EIMs such as peripheral arthritis, axial arthritis, enthesopathy, and arthralgia included. Only 7 studies focused on MSK EIMs as their primary outcome, while the remainder reported on all p-IBD associated EIMs. There was a wide range in the prevalence of MSK EIMs from 2-35% (Figure 1). Four studies reported on the therapeutic response of MSK EIMs, and only 3 of those reported on biologic use. Risk of bias demonstrated heterogeneity in the quality of included studies.
Conclusion: This is the first systematic review of the literature for MSK EIMs in p-IBD. Analysis was limited due to variability in study design and data-reporting methods. Included studies reported prevalence of MSK EIMs, but the ascertainment of MSK EIMs, both method and definition varied with a clear lack in standardization. Our study demonstrates the need for further research to accurately define the MSK associations of p-IBD and explore optimal management to advance care for this group of children.

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Mind the Gap: The Experience of Adolescents in a Rheumatology Transition Clinic

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Objectives: We aimed to assess the transition clinic experiences of 14-18 year-old patients with JIA and SLE and to identify areas where current transition care is not meeting patients' ideal standards.
Methods: The "Mind the Gap" validated questionnaire was administered to our Transition Clinic rheumatology patients aged 114-18 years old attending our Transition Clinic. The questionnaire assesses the transition clinic expectations and experiences and includes 22 questions covering 3 domains: management of environment, provider characteristics and process issues. Patients completed the questionnaire twice on a single occasion; first with respect to their "ideal" experience and second with respect to regarding their current clinic experience. Responses ranged from strongly disagree (1) to strongly agree (7). For each question, a "gap" score was calculated by subtracting the current from the ideal score. A score of 0 signifies that the current experience is ideal; positive scores suggest current care is less than ideal, and negative scores suggest current care exceeds the ideal experience. The greater the positive gap score, the lower the level of satisfaction. Similarly, the greater the negative gap score, the greater the satisfaction. Descriptive statistics summarized our patients' responses.
Results: Of 63 patients (43 female), mean (SD) age 16.4 (1.2) years, 86% had JIA and 14% had SLE. For each domain, the mean gap score was between 0 and 1, indicating virtually no gap

between current and ideal care (Table 1). Table 2 reveals areas where the gap score ≥ 1. The largest frequency of patients recording a gap score ≥ 1 was 45%, for the clinic's ability to communicate information to the patient's school teachers. When comparing gap scores for males and females, mean gap scores were similar for the environment and process issues. However, for provider characteristics, mean (SD) gap scores for females (0.41 (1.2)) appeared higher than males (0.0, (0.5)). Females were less satisfied with how well the staff knew them and the staff's "ability to understand the realities of being a teenager".

Conclusion: Although overall Transition Clinic experiences appear to be meeting the expectations of the majority of our rheumatology patients, there is room for improvement within all three domains. Future directions should include developing standardized interventions to address the identified gaps, such as communication with schools and the provider's abilities to discuss sensitive issues.

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Kawasaki and Kawasaki-like Illness During the Covid-19 Pandemic: A Single Centre Cohort Study

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Objectives: The aim of this study was to describe our cohort of Kawasaki disease (KD) and Kawasaki-like illness (KLI) during the COVID-19 pandemic and to ascertain the incidence of multisystem inflammatory syndrome in children (MIS-C) among these.

Methods: Retrospective chart review was performed of patients diagnosed with KD and KLI at the McGill University Health Centre from March 1st 2020 to May 31st 2021. American Heart Association definitions were applied for complete/incomplete KD and coronary artery dilatations/aneurysms. MIS-C was defined as per CDC and WHO criteria. Information on clinical features, laboratory and cardiac investigations, treatment and outcomes were collected and analyzed. P-values were calculated using chi-scare, Fisher's exact test or Wilcoxon rank-sum test.

Results: Fifty-five patients were included. Median age was 6.2 years; 50.9% were female; 36.4% were either of Afro-Caribbean or Hispanic ethnicities. All patients had fever and at least one other KD criteria. Complete and incomplete KD was diagnosed in 52.7% and 36.4% respectively. A third of patients fulfilled either MIS-C CDC (30.9%) or WHO criteria (34.5%). Acute gastrointestinal symptoms were seen in 81.8% with 6.7% undergoing laparoscopy. Neurological symptoms were common (29.1%). Features of shock were seen in 30.9%. Patients admitted to the ICU (16; 29.1%) were significantly older [median 10.4 vs 5.1 years (p-value:0.0002)]; less likely to fulfill complete KD criteria (p-value:0.034); more likely to have thrombocytopenia (p-value:0.005) or increased troponin (p-value:<0.0001). All patients had increased C-reactive protein; 87.3% had lymphopenia; 58.2% had neutrophilia; 40% had thrombocytopenia. Coagulation dysfunction was present among all tested patients and ferritin was >500 mcg/L in 28%. Troponin was elevated in 39.1% when measured. Coronary dilatations/aneurysms developed in 34.5%, normalizing in 78.9% by 6-8 weeks. Other important echocardiogram findings were seen in 25.5%. Significant ECG abnormalities developed in 7.3% including ventricular tachycardia in one. Patients were treated with IVIG and antiplatelet medications (96.4%), steroids (56.4%), biologics (14.6%), respiratory support (23.6%) and vasopressors (18.2%). Overall, 32.7% had confirmed COVID-19 infections (either by PCR or

serology) or a significant close household contact, with more positive COVID-19 cases admitted to ICU (52.6% vs 20.5%; p-value:0.0026). There were no deaths; all recovered completely except for one with a myopathy and another with coronary aneurysms.
Conclusion: Despite only one third of patients fulfilling definition for MIS-C, the COVID-19 pandemic seems to have modified the presentation of KD and KLI. Patients were older, with the majority having gastrointestinal symptoms and lymphopenia. There was more severe disease but outcomes were good overall.

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An Unusual Presentation of Granulomatosis with Polyangiitis in a Pediatric Patient

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Case Description: A previously healthy 8-year-old female was found to have profound microcytic anemia (hemoglobin 65, mean corpuscular volume 74.1) in the context of a one-month history of decreased appetite, 5-kg weight loss, and worsening fatigue. On presentation, she also reported bilateral lower extremity weakness, accompanied by hyperreflexia and sustained ankle clonus. MRI of the brain and spine was unremarkable. She denied other complaints. On admission, urinalysis revealed moderate proteinuria (urine protein/creatinine ratio 179 mg/mmol) and hematuria, with normal blood pressure, renal function (creatinine 32 umol/L), and complement.

Although she had no cardiac complaints, an echocardiogram revealed severe dilation of multiple coronary arteries. Chest X-ray and abdominal CT were unremarkable.

Bloodwork demonstrated overproduction of antibodies to proteinase 3 (> 8 IU/mL), rheumatoid factor (717 IU/mL), anti-tissue transglutaminase (55.8 U/mL) and anti-endomysial (20 U/L) antibodies. Testing for antibodies to myeloperoxidase, antinuclear antibodies and a panel of extractable nuclear antigens was negative.

Renal biopsy showed focal segmental proliferative and necrotizing glomerulonephritis with active disease in 30% of glomeruli. Immunofluorescence and electron microscopy were consistent with pauci-immune glomerulonephritis with no IgA present, ruling out immune-complex mediated disease. Additionally, punch biopsy of a purpuric heel lesion revealed prominent vasculitis in multiple small vessels. Together with her clinical picture, these biopsy results confirmed granulomatosis with polyangiitis (GPA). Interestingly, CT head, sinuses and chest showed no inflammatory changes.

She began an induction regimen of high-dose glucocorticoids and rituximab with good effect. She continues to be clinically well on azathioprine and a tapering dose of prednisone. Recent urinalysis showed persisting hematuria and mild proteinuria.

Case Discussion: GPA is an ANCA-associated vasculitis that affects the small- to medium-sized vessels. While upper airway involvement is the most common manifestation of GPA, it was notably absent. Additionally, although renal involvement is common, our patient was normotensive and lacked significant renal abnormalities, despite active disease on biopsy. Equally unusual were our patient's neurological and cardiovascular manifestations. Neuropathy is rarely a presenting feature of GPA and we identified only one reported case of large coronary artery aneurysms in a child with GPA. Despite no inflammatory joint or gastrointestinal features, our patient's overproduction of multiple antibodies (including rheumatoid factor and antibodies associated with Celiac disease) is the first report of such biochemical abnormalities in pediatric GPA. This case represents a highly unusual presentation of GPA and highlights the

importance of considering a broad differential diagnosis for children with multi-system involvement.

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Safety Profile of Ixekizumab for the Treatment of Psoriatic Arthritis and Axial Spondyloarthritis Up to 3 Years: an Updated Integrated Safety Analysis

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Objectives: We report a summary of ixekizumab (IXE) safety outcomes with over 2000 patient-years (PY) of exposure up to 3 years in patients with psoriatic arthritis (PsA) and axial spondyloarthritis (axSpA).

Methods: Long-term safety of IXE was assessed from 8 randomized trials in patients with PsA or axSpA. Treatment-emergent adverse events (TEAEs) adjusted incidence rates (IRs) per 100 PY within 1-year time periods through 19 March 2021 were calculated for all patients treated with ≥1 dose of IXE. Safety outcomes included TEAEs, serious AEs (SAEs), discontinuations due to AEs, deaths, and selected safety topics of interest. Major adverse cerebro-cardiovascular event (MACE) and inflammatory bowel disease (IBD) reported cases were adjudicated.

Results: A total of 1401 patients with PsA and 932 patients with axSpA with a cumulative IXE exposure of 2247.7 PY for PsA and 2096.2 PY for axSpA were included in this analysis (Table). The IRs per 100 PY for any TEAE were 50.3 for PsA and 38.1 for axSpA. Serious AEs were reported by 134 patients with PsA (IR=6.0), and 101 patients with axSpA (IR=4.8). A total of 9 deaths was reported, including 6 in PsA (IR= 0.3) and 3 in axSpA (IR=0.1). The IRs per 100 PY of discontinuation from the study drug due to AE were 5.1 (PsA) and 3.1 (axSpA). IRs of serious infections were low (PsA: IR= 1.2, axSpA: IR=1.1). IRs of opportunistic infections (PsA: IR= 1.8, axSpA: IR=0.8) and Candida infections (PsA: IR= 2.0, axSpA: IR=1.2) were low. There were no confirmed cases of reactivation of tuberculosis. Injection site reactions occurred with IRs of 11.6 (PsA) and 7.4 (axSpA). The IRs for allergic/hypersensitivity reactions were 4.5 (PsA) and 4.2 (axSpA). No confirmed events of anaphylaxis were reported. Across indications, IRs were low for cytopenia (≤2.5), malignancies (≤0.7), MACE (≤0.5), depression (≤1.6), and iridocyclitis (≤2.8). Per external adjudication, 20 patients had confirmed IBD (including 3 patients with PsA and 17 with axSpA) of which 1 was confirmed as ulcerative colitis for PsA (IR=0.0) and 10 for axSpA (IR=0.5); 2 events were confirmed as Crohn’s disease for PsA (IR=0.1) and 7 for axSpA (IR=0.3). Across safety topics, IRs were decreased or remained constant over time.

Conclusion: In this updated analysis with 2247.7 PY for PsA and 2096.2 PY for axSpA, IXE maintained a safety profile consistent to that previously reported, with no new or unexpected safety events through exposure up to 3 years.

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Ixekizumab Shows a Pattern of Pain Improvement in Patients With and Without Measurable Inflammation in Psoriatic Arthritis

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Objectives: The efficacy of ixekizumab (IXE) and adalimumab (ADA) in patients with psoriatic arthritis (PsA) has been previously reported using ACR 50 and Psoriasis Area and Severity Index (PASI) 100 responses. To minimize confounding effects, in this analysis we assessed the efficacy of either IXE or ADA monotherapy on reduction of pain beyond measurable inflammation in patients with active PsA and with low C-reactive protein (CRP) (<5mg/L) at baseline.
Methods: This post-hoc analysis of SPIRIT-H2H study (NCT03151551) included only patients treated with IXE or ADA as monotherapy and with low CRP (<5mg/L) at baseline. Changes in joint pain were measured using PsA Patient's Assessment of Pain Visual Analog Scale (VAS). We stratified patients into four categories by two measures of inflammation: 1. Sustained low inflammation either by a. CRP<5 mg/L during W4-24 or b. ≥50% improvement in swollen joint count (SJC) during W8-24. 2. Fluctuating inflammation either by a. CRP≥5 mg/L at least once between W4-24 or b. <50% improvement in SJC at least once between W8-24.
Results: Ninety-five monotherapy patients with a CRP<5mg/L at baseline were included in this analysis. In patients with fluctuating inflammation as measured by CRP, IXE-treated patients demonstrated a numerically greater mean improvement in joint pain VAS vs ADA-treated patients at W16 (IXE:-31.64, ADA:-25.33, Fig.1b) that was sustained up to W52 (IXE:-47.69, ADA:-20.67, Fig.1b). There was significance in favour of IXE at W32 (p=0.0045) and W52 (p=0.0288, Fig.1b). In patients with sustained low inflammation as measured by CRP, there was no difference in improvement in joint pain between IXE and ADA-treated patients (Fig.1a). In patients with sustained improvement in joint swelling as assessed by SJC, IXE-treated patients demonstrated a numerically greater mean improvement in joint pain VAS vs ADA-treated patients from W4 (IXE:-17.47, ADA:-10.42, Fig.1c) that was sustained through W52 (IXE:-43.16, ADA:-32.62, Fig.1c). In patients with fluctuating improvement in joint swelling as assessed by SJC, IXE-treated patients demonstrated a numerically greater mean improvement in joint pain VAS vs ADA-treated patients from W16 (IXE:-22.00, ADA:-19.31, Fig.1d) that was sustained through W52 (IXE:-28.57, ADA:-13.27, Fig.1d).
Conclusion: This analysis suggests a different pattern of pain improvement in patients with low baseline CRP treated with IXE or ADA monotherapy, with a favourable pain reduction outcome for IXE-treated patients, even when inflammation is fluctuating as measured by CRP or SJC improvement. This analysis supports the hypothesis that IXE improves joint pain in PsA patients with and without measurable inflammation.

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The Effect of Ixekizumab Versus Adalimumab on Individual Components of the ACR Composite Score, With and Without Concomitant Methotrexate or Other Conventional Synthetic DMARDs at 52 Weeks in Patients With Psoriatic Arthritis

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Verona); Louis Bessette (Laval University, Quebec)
Objectives: This analysis describes the effect of ixekizumab (IXE) and adalimumab (ADA) on the individual American College of Rheumatology (ACR) components at week (W) 52 in patients with active psoriatic arthritis (PsA) from SPIRIT-H2H.
Methods: Patients from SPIRIT-H2H (NCT03151551, 52 W randomized study) who met Classification Criteria for Psoriatic Arthritis (CASPAR) (N=566), were randomized (1:1, stratified by baseline concomitant csDMARDs and moderate-to-severe psoriasis [PsO]) to IXE or ADA on-label PsA or PsO dosing. Patients were bDMARD-naïve with IR to csDMARDs, active PsA (≥3 tender joints [TJC] and ≥3 swollen joints [SJC]) and had PsO ≥3% BSA (body surface area). Patient's Global Assessment (PtGA) and Physicians Global Assessment (PGA), Health Assessment Questionnaire-Disability Index (HAQ-DI), and joint pain were assessed by visual analog scale, and TJC and SJC as well as C-reactive protein (CRP) were analyzed. All post-hoc analyses were performed on the intent-to-treat (ITT) population. Change from baseline (CFB) in individual ACR components was analyzed using an Analysis of Covariance (ANCOVA) model, for overall as well as with and without concomitant therapies (e.g., MTX or csDMARD). Least square mean (LSM) and standard error (SE) are presented. Missing data were imputed using modified baseline observation carried forward (mBOCF). Nine patients with active PsO and BSA ≥3% were assessed as Psoriasis Area and Severity Index (PASI)=0 at baseline, a medical inconsistency that was resolved using medical judgment. These patients were considered PASI100 responders if PASI=0 and BSA=0 at post-baseline visits.
Results: A total of 566 patients received either IXE (N=283) or ADA (N=283). Baseline values for individual ACR components were balanced between IXE and ADA. At W52, IXE demonstrated efficacy across all individual ACR components in the ITT population, specifically in PGA, PtGA and Joint Pain; ADA also demonstrated numerical efficacy (Fig. A). Improvements from baseline for IXE were observed across ACR components, with or without MTX or csDMARD (Fig. B-E). The effect of MTX (with or without) was notably different between IXE and ADA in TJC68, PGA, Joint Pain, and PtGA.
Conclusion: In this analysis, there was improvement with IXE in all components of the ACR composite score at W52, irrespective of MTX or csDMARD use. In the ITT population, IXE showed comparable efficacy to ADA at W52 in all ACR components, demonstrating improvement across musculoskeletal domains. These results may provide further confidence of the clinical benefits of IXE across musculoskeletal domains in patients with PsA, regardless of MTX or csDMARD use.

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Achieving Treatment Targets and Treatment Satisfaction in Psoriatic Arthritis Patients Treated With Apremilast in Canada at 1 Year

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Objectives: To better understand the long-term effectiveness, tolerability, and overall satisfaction with apremilast (APR) for treatment of active psoriatic arthritis (PsA) in real-world

Canadian clinical settings.
Methods: APPRAISE (NCT03608657) is a prospective, multicenter, observational study, enrolling adult patients with active PsA prescribed APR per routine care. Patients were followed from treatment initiation to 12 months, with follow-up visits suggested every 4 months. The primary outcome measure is achievement of low disease activity (LDA: cDAPSA score <14). Baseline patient demographics were summarized descriptively. Continuous outcomes at Months 4, 8, and 12 were analyzed by paired Student's t-test or McNemar's test. Data are presented as observed.
Results: Between July 2018 and March 2020, 102 patients were enrolled. Mean (SD) age was 51.8 (11.7) and 5.5 (7.9) years, respectively, with the majority of patients female (56.9%) and white (96.1%). Overall, 74.3% of patients presented with ≥1 comorbidity, and 44.6% presented with ≥2; almost half had cardiometabolic disease, and one-quarter anxiety or depression. Baseline cDAPSA indicated moderate/high disease activity in 75.5% of patients. The proportion of patients with cDAPSA LDA increased from 24.5% of patients at baseline, to 53.8% of patients at Month 12; changes in cDAPSA score from baseline to all study visits were statistically significant (Table 1). A decrease over time in rates of enthesitis (34.0% at baseline) and dactylitis (18.2% at baseline) was observed, with SJC (0-66) and TJC (0-68) declining significantly from baseline to Months 4, 8, and 12 (Table 1). Mean TSQM Overall Satisfaction scores improved over 12 months (Table 1), and the proportion of patients achieving PASS increased significantly from baseline (26.3%) to Months 4 (53.5%), 8 (63.2%), and 12 (68.0%). Significant improvements from baseline were observed in additional clinical and patient-reported outcomes (Table 1). A total of 48 (47.1%) patients discontinued the study, with lack/ loss of effectiveness (21 [43.8%]) and adverse events (AE) (21 [43.8%]) the most common reasons. In patients discontinuing treatment due to AEs, diarrhea (9/48 [18.8%]), nausea (4/48 [8.3%]), and migraine (4/48 [8.3%]) were the most common. COVID restrictions impacted in-office assessment visits, necessitating reliance on virtual visits.
Conclusion: In this real-world analysis, Canadian patients with PsA treated with APR over a 12-month period have achieved continuous improvements in clinical and patient- reported parameters, with the majority satisfied with their disease state. The observed safety profile of APR is consistent with previously reported clinical data.

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What Influences Fatigue Improvement in Rheumatoid Arthritis? A Prospective Cohort Study

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Objectives: Fatigue is a common and debilitating complication in patients with rheumatoid arthritis (RA). Its mechanism is not fully elucidated, and when persistent, is often challenging to manage. Despite treatment with DMARDs, a proportion of patients will continue to have fatigue raising the necessity to investigate other non-DMARDs therapeutic options. This study aimed to explore characteristics that correlate with fatigue improvement in adult patients with RA.
Methods: A single-centered prospective cohort study of 111 adult patients with rheumatoid arthritis. Fatigue level was measured using fatigue numerical rating scale (NRS) ranging from 0 to 100. Fatigue was measured at the time of enrollment and 6, 12 and 24 months follow-up appointments. The minimal clinically important difference (MCID) for the fatigue NRS (6.7% change from baseline) was used to assess the change in fatigue level compared to baseline. Univariate and multivariate (adjusting for age, gender and BMI) logistic regression

analyses were performed to examine the association between fatigue improvement at 12 months and baseline demographics and disease characteristics.
Results: The median (interquartile range [IQR]) for age was 55 (44-61) years and the majority were Caucasian (67%), females (88%), and with an above-average BMI (71%). The median (interquartile range [IQR]) of fatigue scores at enrollment and 12 months were 40 (8-70) and 38 (5-58), respectively. At 12 months, fatigue level improved in half of the population (Table 1). In a univariate analysis, several predictors were noted to be associated with improved fatigue scores. These included female gender ($p< 0.001$), non-smokers ($p< 0.01$) and increased baseline fatigue levels ($p=0.04$). Several other variables, including depression, showed a trend towards significance. These variables were further investigated using a multivariate analysis (adjusting for age, gender and BMI). Non-smokers were found to be highly likely to improve fatigue levels at year-end (OR 7.63, 95% CI 1.11-52.63, $p=0.04$) compared to smokers. In addition, baseline depression was found to be linked with a significantly lower likelihood of improving fatigue level (OR 0.17, 95% CI 0.03-0.82, $p=0.03$). Many other variables were examined, and none were found to be associated with the outcome of interest including BMI, employment status, physical activity level, pain control, number of comorbidities, duration of RA, CDAI score, switching to biological DMARDs, or RF and CCP seropositivity.
Conclusion: We observed in this cohort study an improvement in fatigue level in half of the population. The female gender, non-smoking status and lack of depression were all associated with fatigue improvement at 12 months.

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An Independent Treatment Effect of Baricitinib in Reducing Fatigue After Adjusting for Clinical Disease Activity: Results from the RA-BEACON Phase 3 Trial

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Objectives: Fatigue is common in rheumatoid arthritis (RA) and impairs quality of life. Baricitinib improved fatigue, pain, and other patient-reported outcomes in patients with active RA and an inadequate response (IR) to ≥1 tumor necrosis factor inhibitors or other biological DMARDs (bDMARDs). The objective of this post-hoc analysis was to estimate the proportion of independent (direct) treatment effect of baricitinib on fatigue after adjusting for the indirect effect mediated by improvement in clinical disease activity in bDMARD-IR RA patients with data from the phase 3 trial, RA-BEACON (NCT01721044).
Methods: In RA-BEACON, all patients (N=527) had a diagnosis of adult-onset RA, defined by ACR/EULAR 2010 Criteria. Fatigue was measured with the Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F). Disease activity was measured with the Clinical Disease Activity Index (CDAI). Spearman's rank correlation between FACIT-F and CDAI was calculated by pooling all visits up to Week 24 across baricitinib 2-mg and placebo arms. A longitudinal mediation analysis was implemented to evaluate whether and how much the effect of baricitinib 2-mg on FACIT-F was mediated through the improvement of CDAI. The independent variable in the mediation analysis was treatment (baricitinib 2-mg or placebo). The dependent variable was change in FACIT-F from baseline to Week 4, 8, 12, 16, 20, and 24, and the mediator was the change in CDAI from baseline to Week 4, 8, 12, 16, 20, and 24. The treatment effect of baricitinib 2-mg on FACIT-F over placebo that could be accounted for by changes in CDAI was the indirect effect, and that which could not be accounted for by changes

in CDAI was the direct effect. Missing values were imputed by the modified last observation carried forward method.
Results: For placebo and baricitinib 2-mg, respectively, the least-squares mean change in FACIT-F was 5.2 and 8.3 ($P<0.01$) at Week 12 and 5.7 and 8.1 ($P<0.05$) at Week 24. Spearman's rank correlation coefficient between FACIT-F and CDAI was –0.5 ($p<0.001$), implying that fatigue and disease activity were moderately correlated. Results of the mediation analyses indicated that less than 50% of improvement in the FACIT-F among the baricitinib 2-mg-treated patients was mediated through CDAI improvement. At Week 12 and Week 24, respectively, approximately 58% and 50% of the impact of baricitinib on FACIT-F was independent of effects mediated through CDAI.
Conclusion: In this bDMARD-IR patient population, a substantial effect of baricitinib 2-mg on fatigue is independent of its effect on disease activity improvement.

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Discontinuation Rate of Tofacitinib as Monotherapy is Similar Compared to Combination Therapy with Methotrexate in Rheumatoid Arthritis Patients: Pooled Data from Two Rheumatoid Arthritis Registries in Canada

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Objectives: Tofacitinib (TOFA) is an oral, small molecule drug used for rheumatoid arthritis (RA) treatment and is prescribed alone or with methotrexate (MTX). Tofa can be used as an alternative to biologic disease modifying antirheumatic drugs (bDMARDs) including tumor necrosis factor inhibitors (TNFi). We aimed to evaluate the discontinuation rate of this drug, with and without concurrent MTX in comparison with TNFi, in patients with RA in the Ontario Best Practices Research Initiative (OBRI).
Methods: RA patients enrolled in the OBRI initiating their TOFA between 1st June 2014 (TOFA approval date in Canada) and 31st Dec 2018 were included. Concurrent MTX use was defined as MTX use for more than 75% of the time while using TOFA. Time to discontinuation (due to any reason) were assessed using Kaplan-Meier survival (adjusted for propensity score using inverse probability of treatment weight) to compare patients with and without MTX use at initiation of TOFA. We used multiple imputation (N=20) to deal with missing data for covariates at treatment initiation.
Results: A total of 493 patients initiated TOFA. Of those, 244 (49.5%) and 249 (51.5%) were treated with and without MTX, respectively. Compared to TOFA monotherapy, the TOFA with MTX group had a significantly lower mean HAQ-DI, fatigue score, and number of prior biologic use at the time of TOFA initiation. A lower proportion of positive ACPA (59% vs. 66%)1, prevalence of hypertension (31% vs 37%), and concomitant use of Leflunomide (11% vs. 23%) were also observed for patients using TOFA with MTX. Over a mean of 19.0 month follow-up, discontinuation was reported in 182 (36.9%) of all patients. After adjusting for propensity score quantile across 20 imputed datasets, there was no significant difference in discontinuation between treatment groups (adjusted HRs: 1.12, 95% CI: 0.83-1.51; p=0.49) (Figure 1).
Conclusion: In this pooled real-world data study, we found that in patients with RA, the retention of TOFA is similar if it is used as monotherapy or in combination with MTX. MTX

could be stopped if needed in a sub-population of patients with RA.

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Biologics Initiation in Moderate Vs Severe Rheumatoid Arthritis Patients: Prospective Observational Study From a Canadian Registry

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Objectives: Prior studies have shown that in the real-world setting, rheumatoid arthritis (RA) patients have lower disease activity than those studied in clinical trials. However, randomized controlled trials for biologics continue to mainly recruit patients with severe disease. To assess the implications of this practice, our study investigated clinical responses to biologics in RA patients with moderate disease activity versus severe disease activity, after 12 months of starting the first biologic, and identifies baseline patient characteristics associated with biologic response.

Methods: This study included RA patients who have never been treated with a biologic and initiated their first biologic while enrolled in the Ontario Best Practices Research Initiative (OBRI) registry, between 2008 and 2019. Patients selected had either moderate RA (DAS28 $\geq$ 3.2 to $\leq$ 5.1) or severe RA (DAS28 > 5.1). Comparisons were made between the moderate and severe disease groups using the student's t-test for continuous variables, and the chi-square test for categorical variables. Multivariate logistic regression was used to test characteristics associated with remission.

Results: 264 moderate RA patients and 219 severe RA patients were selected. In the moderate group, the mean age (SD) was 55.7 (13.1) and 80% were female. In the severe group, mean age (SD) was 58.4 (12.3) and 81% were female. At time of biologic initiation, the mean DAS28 for the moderate group was 4.1 (0.5), and 6.0 (0.6) for the severe group. After 12 months of starting a biologic, the proportion of patients achieving remission was 50% in the moderate group, and 23% in the severe group ($p<0.0001$). In contrast, the absolute improvement in DAS28 after 12 months was higher in the severe group at 2.2 (1.5), compared to 1.4 (1.3) in the moderate group ($p<0.0001$). Characteristics negatively associated with remission include female gender (odds ratio (OR), 0.54, 95% confidence interval (CI), 0.31-0.94; p=0.0306), RA disease duration (OR 0.96, 95% CI 0.93-0.995, p=0.0272), and higher HAQ-DI score (OR 0.51, 95% CI 0.32-0.80; p=0.0001). In turn, moderate disease at time of biologic initiation (OR 2.35, 95% CI 1.44-3.82; p=0.0006) was positively associated with remission.

Conclusion: This prospective cohort study found RA patients with moderate disease activity were more likely to reach target states (remission and low disease activity), whereas severe patients had greater absolute improvements in DAS28 and HAQ-DI. Moderate disease was positively associated remission, whereas female sex, RA disease duration and higher HAQ-DI score were negatively associated with remission.

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Safety Profile of Baricitinib for the Treatment of Rheumatoid Arthritis up to 9.3 Years: An Updated Integrated Safety Analysis

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Objectives: To report baricitinib's (bari) safety profile with data up to 9.3 years of treatment.
Methods: Pooled data from 9 randomized (5 Phase 3, 3 Phase 2, 1 Phase 1b) and 1 long-term extension (LTE) study were assessed. Incidence rates (IR) per 100 patient-years at risk (PYR) were calculated for all patients treated with ≥1 dose of bari (All-bari-RA). Adverse events (AEs) of interest were assessed over time in 48-month intervals. Major adverse cardiovascular events (MACE) were adjudicated in 5 Phase 3 studies and the LTE. Incidence rates for MACE were also evaluated in subgroups of patients age ≥50 years and presenting with ≥1 cardiovascular risk factor (current smoker, hypertension, high-density lipoprotein cholesterol <40 mg/dL, diabetes, or arteriosclerotic cardiovascular disease). Exposure adjusted IRs (EAIRs) for deep vein thrombosis (DVT), pulmonary embolism (PE), and DVT and/or PE (DVT/PE) were also calculated for groups of patients while receiving bari 2-mg or bari 4-mg within All-bari-RA.
Results: A total of 3770 patients received bari for 14,744.4 PYE with a median exposure of 4.6 years and a maximum exposure of 9.3 years; 80.5% of PYE were bari 4-mg and 18.1% of PYE were bari 2-mg. Overall, EAIRs per 100 PYE for any treatment-emergent AE and serious AE (including death) were 22.6 and 7.4, respectively . Overall IRs per 100 PYR were 2.58 for serious infections; 0.35 for DVT, 0.26 for PE, 0.49 for DVT/PE, 0.51 for MACE, and 0.92 for malignancy; IRs remained stable over time (Figure). The IR (95% CI) of MACE for patients age ≥50 years was 0.68 (0.52, 0.88). In patients age ≥50 with ≥1 of the cardiovascular risk factors, IR (95% CI) of MACE was 0.77 (0.56, 1.04). EAIRs (95% CI) for patients while receiving bari 2-mg (PYE=2678) and bari 4-mg (PYE=11,872) were DVT 2-mg 0.41 (0.21, 0.73) and 4-mg 0.35 (0.25, 0.48); PE 2-mg 0.26 (0.11, 0.54) and 4-mg 0.27 (0.18, 0.38); and DVT/PE 2-mg 0.49 (0.26, 0.83) and 4-mg 0.51 (0.39, 0.66).
Conclusion: In this report with 14,774 PYE, bari maintained a safety profile similar to that previously reported with no increase of IRs across safety events through exposures up to 9.3 years.

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Consistency in Time to Response With Upadacitinib as Monotherapy or Combination Therapy and Across Patient Populations With Rheumatoid Arthritis

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Objectives: Upadacitinib (UPA) has demonstrated efficacy in patients with moderate-to-severe rheumatoid arthritis (RA) across patient populations. This post hoc analysis aimed to evaluate the consistency in time to achieving meaningful clinical response with UPA 15 mg + conventional synthetic (cs) DMARDs in biologic (b) DMARD-inadequate responder (IR) versus csDMARD-IR patients with RA as well as with UPA 15 mg monotherapy versus UPA 15 mg + csDMARDs in csDMARD-IR patients.
Methods: Patients randomized to UPA 15 mg from four Phase 3 trials were included in this analysis: SELECT-BEYOND and SELECT-CHOICE (UPA 15 mg + csDMARDs in bDMARD-IR patients), SELECT-NEXT (UPA 15 mg + csDMARDs in csDMARD-IR patients), and SELECT-MONOTHERAPY (UPA 15 mg in methotrexate-IR patients). Time to response was estimated using Kaplan–Meier method for clinical outcomes over 24/26 weeks. Clinical

outcomes included achievement of 28-joint Disease Activity Score with C-reactive protein (DAS28[CRP]) ≤3.2; low disease activity (LDA) defined as Clinical Disease Activity Index (CDAI) ≤10 and Simple Disease Activity Index (SDAI) ≤11; and 50% improvement in American College of Rheumatology (ACR) core components and morning stiffness (MS) duration/severity. Data presented as observed.
Results: 905 patients were included (SELECT-BEYOND: n=164; SELECT-CHOICE: n=303; SELECT-NEXT: n=221; SELECT-MONOTHERAPY: n=217). csDMARD-IR patients had mean disease duration of 7.3 (SELECT-NEXT) or 7.5 years (SELECT-MONOTHERAPY); bDMARD-IR patients had mean disease duration of 12.4 years, with a more refractory population (≥3 prior bDMARDs) in SELECT-BEYOND (23%) than SELECT-CHOICE (10%). The median time to DAS28(CRP) ≤3.2, CDAI LDA, 50% improvement in ACR core components, and 50% improvement in MS duration/severity were consistent across studies. For SELECT-BEYOND, SELECT-CHOICE, SELECT-NEXT, and SELECT-MONOTHERAPY, median (95% CI) time to achieve DAS28(CRP) ≤3.2 was 12 (12, 16), 12 (8, 12), 12 (8, 12), and 14 (8, 14) weeks(Figure 1a), and median time to achieve CDAI LDA was 20 (12, 24), 16 (12, 16), 16 (12, 16), and 20 (14, 20) weeks, respectively (Figure 1b). A longer median (95% CI) time to achieve SDAI LDA was observed with UPA monotherapy (20 [14, 20] weeks) versus UPA + csDMARDs (12 [12, 16] weeks) in csDMARD-IR patients. Among bDMARD-IR patients, median (95% CI) time to 50% improvement in pain was longer in SELECT-BEYOND versus SELECT-CHOICE (16 [12, 20] versus 8 [8, 12] weeks).
Conclusion: In diverse patient populations with RA, patients treated with UPA 15 mg, as monotherapy or with csDMARDs, demonstrated consistent time to achieving DAS28(CRP) ≤3.2, CDAI LDA, and 50% improvement in clinical outcomes.

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Characteristics and Outcomes of Rheumatoid Arthritis Patients Treated with Upadacitinib in Real-world Canadian Clinical Practice

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Objectives: Upadacitinib (UPA) is a selective Janus Kinase 1 receptor inhibitor, approved for the treatment of rheumatoid arthritis (RA) in Canada in January 2020. Our objective was to describe clinical usage and outcomes of Canadian RA patients receiving UPA.
Methods: The Adelphi RA Disease Specific Programme™ is a point-in-time survey conducted amongst rheumatologists. Physicians completed online record forms for RA patients who had received upadacitinib for at least 6 months. We report here the interim demographic and clinical outcomes data of an ongoing survey.
Results: Current data was provided by 8 rheumatologists for 47 patients (expected total: 20 rheumatologists, 200 patients). The mean age of these patients was 49.6 (SD 11.3), 74% were female and mean RA duration of 4.2 years (SD 3.8, n=46). Mean Charlson Comorbidity Index was 1.2 (SD 0.7). Patients were receiving upadacitinib for an average of 10.5 months (SD 3.5). UPA was the first advanced therapy in 51% of patients and as a second or later line therapy after a JAKi (28%), a TNFi (21%), and/or other modes of action (9%) in the remaining patients. UPA was initiated predominantly in combination with background csDMARDs (74%) and after ≥ 6 months of UPA use, this combination decreased to 23%. 11% of patients received UPA in combination with a steroid, dropping to 2% after ≥ 6 months of UPA use. Disease activity

measures were documented inconsistently. Physician-perceived disease severity improved in 62% of patients with ≥ 6 months of UPA use. At UPA initiation, mean tender joint count was 12.0 (SD 3.0, n=34), mean swollen joint count was 9.0 (SD 4.0, n=44) and mean CDAI score was 30.7 (SD 7.4, n= 21). After ≥ 6 months of UPA use, this had reduced to 1.8 (SD 2.1, n=26), 0.6 (SD 1.1, n=33) and 3.8 (SD 3.5, n=18) respectively, with 44% (n=8) of patients with reported CDAI scores (n=18) in remission (0.0-2.8) and 44% (n=8) with low disease activity (2.9-10.0) (Table 1).

Conclusion: Interim analysis of real-world data in Canadian RA patients demonstrates expected rates of improvement in disease activity after ≥ 6 months of treatment with UPA. In addition, ≥ 6 months of treatment with UPA led to a reduction in combination csDMARD and steroid therapy use. Full analysis is planned when data collection is complete. Rheumatologists may need better tools for documenting routine disease activity measures in the real world.

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Assessing the Relationship of Patient Global Assessment of Disease Activity and Health Related Quality of Life by SF-36 with Other Patient-Reported Outcomes in Rheumatoid Arthritis: Post Hoc Analyses of Data from Phase 3 Trials of Baricitinib

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Objectives: To examine the relative importance of patient reported outcomes (PROs) on the Patient Global Assessment of Disease Activity (PtGA) and health-related quality of life (HRQoL) and whether these differ in patients with good disease control vs. those not in low disease activity (LDA) or remission in different patient populations in baricitinib (bari) phase 3 studies.

Methods: We report post-hoc analyses of: RA-BEGIN (conventional synthetic DMARD-naive patients[n=588]); RA-BEAM (MTX-inadequate response (IR) patients[n=1307]); and RA-BEACON (biologic DMARD-IR patients(n=527). PtGA was measured by a visual analog scale (VAS, 0-100 mm) and HRQoL was measured by SF-36 physical component summary (PCS) and mental component summary (MCS) scores. PROs included pain (VAS, 0-100 mm), Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F), duration of morning joint stiffness (AMJtS), and Health Assessment Questionnaire-Disability Index (HAQ-DI). Good disease control was defined as either LDA or remission by Clinical Disease Activity Index (CDAI, ≤10 and ≤2.8, respectively). Within each RCT, treatment-agnostic correlation analyses at all time points from baseline to Week 24 were performed. Multiple regression analyses for the overall population and for patients in LDA, remission or nonresponse were conducted; we present standardized parameter estimates from the regression analyses for each PRO to assess their relative importance on the PtGA, PCS score and MCS score.

Results: Across RCTs, pain strongly correlated with PtGA (r: 0.9); FACIT-F moderately correlated with PtGA, PCS, and MCS scores (r: 0.6 to 0.7; FACIT-F and PtGA are negatively correlated); and HAQ-DI moderately-to-strongly correlated with PtGA and PCS score (r: 0.6 to 0.8; HAQ-DI and PCS are negatively correlated). Duration of AMJtS was weakly correlated with the other PROs (r: -0.2 to -0.3 for PCS and MCS and 0.3 to 0.4 for PtGA). In regression analyses across RCTs at baseline and Week 24 for the overall populations, the most significant factors were pain with PtGA , HAQ-DI with SF-36 PCS score , and FACIT-F with SF-36 MCS score.

Similar results were observed in patients in LDA, remission, or nonresponse.
Conclusion: These results confirm prior findings, such as high correlations of pain with PtGA. We, however, observed that the relationships between other PROs with PtGA, PCS, or MCS scores were stable across time points over the first 6 months of treatment in differing patient populations, ranging from early to later disease. PtGA, PCS, and MCS scores were each associated with different PROs, indicating the importance of collecting multiple PROs in RCTs and real-world clinical practice.

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Rapid Clinical Response in Patients with Moderately to Severely Active Rheumatoid Arthritis Treated with Baricitinib

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Objectives: To investigate the speed of response to baricitinib (BARI) across disease measures in patients (pts) with rheumatoid arthritis who had an inadequate response (IR) to conventional synthetic DMARDs (csDMARDs) and biological DMARDs (bDMARD).
Methods: Data were assessed from two phase 3 studies, RA-BUILD (NCT01721057; csDMARD-IR pts) and RA-BEACON (NCT01721044; bDMARD-IR pts). Time to first achievement of each of the following responses over 24 weeks were evaluated: ACR 20% and 50% improvement (ACR20 and ACR50), DAS28-CRP low disease activity (DAS28-CRP LDA) $\leq$3.2, Clinical Disease Activity Index (CDAI) LDA $\leq$10, and 50% reduction in 68 Tender Joint Count (TJC68) or 66 swollen joint count (SJC66). Hazard ratios (HR) between BARI 2-mg and placebo (PBO) and the corresponding p-values were obtained using Cox proportional hazards model adjusted for treatment group and main stratification factors (RA-BUILD: region and baseline joint erosion status; RA-BEACON: region and history of bDMARD use). All analyses were based on observed data without imputation.
Results: In the csDMARD-IR population, BARI 2-mg treated pts were significantly more likely to achieve ACR20 (HR: 1.53, p<0.001), ACR50 (HR: 1.84, p<0.001), DAS28-CRP LDA (HR: 1.90, p<0.001), CDAI LDA (HR: 1.54, p<0.001), SJC66 50% reduction (HR: 1.27, p=0.013) and TJC68 50% reduction (HR: 1.29, p=0.011) compared with PBO. Median time to first achievement of ACR20, DAS28-CRP LDA, SJC66 50% reduction and TJC68 50% reduction with BARI 2-mg was 4 weeks, 10.9 weeks, 1.7 weeks, and 4 weeks faster than PBO, respectively. Median time to first achievement of ACR50 with BARI 2-mg was 16 weeks and 14.9 weeks for CDAI LDA, whereas the median did not occur for PBO during the 24 weeks. In the bDMARD-IR population, BARI 2-mg-treated pts were significantly more likely to achieve ACR20 (HR: 1.62, p<0.001), ACR50 (HR: 1.90, p<0.001), DAS28-CRP LDA (HR: 1.95, p<0.001), and CDAI LDA (HR: 1.66, p=0.007) and had numerical quicker response in SJC66 50% reduction and TJC68 50% reduction compared with PBO (SJC66: HR: 1.17, p=0.183; TJC68: HR: 1.13, p=0.313). As for the median time to achieve clinical response, similar trends were observed between the csDMARD-IR and bDMARD-IR populations.
Conclusion: In csDMARD and bDMARD-IR patient populations, treatment with BARI was more likely to achieve quicker clinical response than PBO. Time to achieve clinically meaningful responses was faster in pts treated with BARI than those who received PBO.

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Rheumatoid Arthritis and Oral Health Associations in the Canadian Longitudinal Study of

Aging

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Objectives: Periodontal disease (PD) is a frequent but neglected comorbidity of rheumatoid arthritis (RA) and may contribute to RA development or persistent disease activity. The Canadian Longitudinal Study of Aging (CLSA) collected data from community-residing older individuals including medical history, medication use, function assessments and oral health symptoms and habits. The aim of this study was to evaluate the association between RA and oral health using the CLSA data.

Methods: The CLSA baseline data from 300,097 individuals was analyzed. Individuals who self-reported an RA diagnosis and taking DMARDs were considered to have RA. Individuals who self-reported having at least one symptom of loose natural teeth, sore or bleeding gums around natural teeth were considered to have PD. Maximum grip strength was considered a surrogate of upper extremity function relevant to RA. Descriptive statistics are reported.

Results: We identified 268 individuals with RA (cohort prevalence 0.9%; 73% female with average (standard deviation) age of 64.3 (10.2) years, > 95 % White). For individuals with oral health data (N=28692), compared to non-RA (n=28435), RA participants (n=257) reported worse general physical health (excellent general physical health for RA 0.06% versus non-RA 21%; $p<0.0001$) but similar oral health (Figure). No significant differences in the cohort prevalence of diabetes, osteoarthritis of hands, knee and hips, other arthritis, and smoking were observed between the groups. Compared to non-RA, a greater proportion of RA participants reported edentulism (35% vs. 25%), uncomfortable eating sometimes (17% vs. 5%), avoiding eating sometimes (9% vs. 5%) and issues chewing adequately (15% vs. 8%), all $p<0.0001$, and a greater proportion reported swelling in the mouth, dry mouth, burning mouth, jaw muscle pain, and jaw joint pain (all $p<0.05$). Only 42% of non-RA and 31% of RA participants reported no oral health concerns ($p<0.0001$). The cohort prevalence of at least one PD symptom was 20% for RA and 19% for non-RA participants (p=NS). Compared to non-RA, RA participants had poorer grip strength (mean difference; 95% CI -8.8; -10.2, -6.9; $p<0.0001$). Multivariable modelling identified age and grip strength but not RA or sex to associate with PD symptoms.

Conclusion: In this cohort of elderly Canadians, RA participants had worse self-reported oral health symptoms than non-RA participants. Although PD symptoms were common and associated with upper extremity function, dental examination is required to determine true PD cohort prevalence. Greater attention to and management of the oral health needs of elderly RA patients is needed.

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Evaluating Frailty in Rheumatoid Arthritis: A Scoping Review

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Objectives: Frailty is emerging as a useful construct for understanding the heterogeneous outcomes observed among patients with rheumatic diseases. This scoping review aimed to 1) Identify measures/tools used to characterize frailty in individuals with rheumatoid arthritis (RA); and 2) Compare estimates for the prevalence of frailty among RA patients across the identified measures/tools.

Methods: This review was performed according to the Preferred Reporting Items for Systematic

Review and Meta-Analyses extension for Scoping Reviews. MEDLINE, EMBASE, and CINAHL were searched from database inception to September 15, 2021, using keywords and Medical Subject Headings for "rheumatoid arthritis" and "frailty", as well as additional search terms related to known frailty instruments. Full-text, English language articles of any study design that described the development, application, or validation of frailty measures/tools in patients with RA were included. Pertinent data were extracted from the included articles, which were also assessed for risk of bias using NHLBI Study Quality Assessment Tools.
Results: The search yielded 199 articles for title/abstract review, of which 52 underwent full text review. Twenty articles (15 cross-sectional studies, 4 cohort studies, and 1 meta-analysis of individual patient data from RCTs) met the inclusion criteria. All included studies were published in 2017 or later and received overall ratings of "fair" in the risk of bias assessment. Frailty was assessed using 13 different instruments, including 3 measures developed specifically for RA patients. While 10 of 13 instruments assessed multiple health domains, all were heavily weighted towards physical deficits. The frailty phenotype and the Kihon Frailty Checklist were the most frequently used measures (4 studies each). The frailty index (FI) approach was used in three studies (Table 1). Eighteen studies reported the prevalence of frailty among RA patients, with estimates ranging from 10% to 73%. In 11 studies, the prevalence of pre-frailty ranged from 20.4% to 71%. Three studies comparing individuals with versus without RA reported a significantly higher prevalence of frailty among RA patients (16.6-37.6% for RA vs. 3.4-15.7% for non-RA). Most studies (7/12) reported increasing prevalence of frailty with older age, although this relationship was attenuated when compared to individuals without RA. In 7/9 studies, the prevalence of frailty was higher among females when compared to males.
Conclusion: While different measures/tools used to assess frailty in patients with RA produce a wide range of estimates for its prevalence, studies have consistently demonstrated an increased prevalence of frailty among RA patients when compared to individuals without RA.

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Transient Temporal Arteritis Post-COVID-19 Vaccination

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Background: Giant Cell Arteritis (GCA) is a primary vasculitis affecting medium to large vessels in people over 50. Temporal arteritis describes the common clinical subtype affecting the cranial arteries. However, inflammation of the temporal arteries can occur due to infections and other inflammatory conditions. Untreated, GCA can lead to complications, including blindness and stroke.
Case Description: A 49-year-old woman with known homozygous factor V Leiden developed greater saphenous vein superficial thromboembolism two days after receiving the AstraZeneca vaccine. Sixteen days post-vaccine, she developed pulsatile, non-painful, right temporal artery swelling with new-onset headaches. She had no other GCA symptoms (i.e., scalp tenderness, jaw claudication or visual symptoms). CRP and D-dimer remained normal at 0.4mg/L (N<4.8) and 222ng/mL (N<500), respectively. On day 2, her family physician suspected GCA and initiated prednisone 30mg with the resolution of headaches by day 3. On day 4, when seen at the GCA Fast Track clinic, she had resolution of temporal artery swelling. Physical exam and ultrasound assessment of the cranial vessels were unremarkable[DE1] . Day 5-17, prednisone was rapidly tapered from 30 to 5mg with mild transient temporal swelling at 5mg lasting less than 48 hours. By day 22, she tapered off prednisone without reoccurrence of symptoms. Moderna vaccine was

administered 12 weeks later with mild recurrence of right temporal artery swelling three days post-vaccination without any other GCA symptoms; however, CRP and D-dimer increased to 9.1mg/L (N<4.8) and 786ng/mL (N<500), respectively. Given the patient's previous self-resolving course, she was monitored closely without initiation of prednisone. The temporal artery swelling resolved over five days with normalization of the CRP to 1.1mg/L. She has not had any recurrent symptoms since.

Discussion: This case illustrates the potential to develop transient temporal arteritis after COVID vaccination. Influenza vaccines containing adjuvants have resulted in reactions mimicking GCA. Given that COVID vaccines do not contain adjuvants, this represents a novel finding that has not been reported to date in COVID vaccines.
Conclusion: Awareness of transient temporal arteritis as a vaccine reaction is vital to recognize to prevent over-treatment with corticosteroids in patients as this could interfere with vaccine response.

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I Simply Cannot See What the Problem is

Ali Shams (University of Saskatchewan, Saskatoon)

A 29-year-old female is referred to Rheumatology by Internal Medicine for progressive bilateral vision loss on a presumed diagnosis of granulomatosis with polyangiitis (GPA) made in the community. On review of systems, the patient endorsed a rash, joint pain and swelling as well as oral and nasal ulcers. Investigations were notably positive for ANCA atypical neutrophil staining but MPO and PR3 were negative. CRP was 17.3. The rest of the autoimmune workup was negative. Ophthalmology assessment yielded differential diagnoses of fungal endophthalmitis, systemic inflammatory disease, and other infectious process. There was retinal involvement seen on ophthalmoscopy. As the patient's visual loss worsened to near blindness, Rheumatology elected to initiate pulse steroids and intravenous cyclophosphamide. Upon follow-up four days later, there was no improvement in the patient's visual symptoms. The patient's serum then tested positive for syphilis. A course of appropriate intravenous antibiotics was completed but the patient's vision never recovered.
The rate of infectious syphilis in Canada is on the rise at an incidence of 11.2 per 100,000 in 2017, almost four times the incidence of GPA. Secondary syphilis can present very similarly to systemic vasculitis. However, retinal involvement is an exceedingly rare manifestation of GPA and should point to another disease process.
The following case presentation explores a challenging diagnosis of secondary syphilis closely mimicking systemic vasculitis.

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A Novel Syndrome...Hiding in Plain Sight

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Background: VEXAS (Vacuoles, E1 enzyme, X-linked, autoinflammatory, somatic) syndrome is a novel adult-onset autoinflammatory syndrome, discovered using a unique genotype-driven approach. The clinical features of VEXAS bridge rheumatologic and hematologic conditions and as such, rheumatologists should be aware of its unique presentation. The objective of this case report is to describe the clinical features of VEXAS.
Case presentation: A 61-year-old male, with a history of diabetes, was referred to rheumatology for a third opinion in context of having a 3-year history of the diffuse rashes, recurrent DVTs and polyarthritis not responsive to a plethora of immunosuppressive medications. His symptoms

began with erythematous plaques and papules throughout his body with a skin biopsy showing a neutrophilic dermatosis (working diagnosis of Sweet's syndrome). The rash was only responsive to high doses of prednisone and would recur on moderate doses of prednisone, approximately 20 mg. He then developed 2 unprovoked DVTs for which he was anticoagulated and soon after, developed symmetrical polyarthritis involving his wrists, MCPs and MTPs on a background of also developing constitutional symptoms of fever, chills and night sweats that were also only responsive to high dose of prednisone. He was diagnosed as having concomitant seronegative rheumatoid arthritis and was placed on several conventional disease modifying antirheumatic drugs including methotrexate, sulfasalazine and leflunomide and thereafter, treatment was escalated to biologics with no improvement of his symptoms. His rashes, inflammatory arthritis and constitutional symptoms would recur on 20 mg of prednisone despite immunosuppression. On blood work, he had a progressive macrocytic anemia and bone marrow biopsy only showed a hypercellular bone marrow with no evidence of dysplasia. He was also evaluated by infectious disease and underlying infectious trigger was not identified.
He was seen for the first time in the vasculitis 3 months after the initial description of VEXAS syndrome and we recognized that the patient had the following features of this syndrome: neutrophilic rashes, polyarthritis, constitutional symptoms, recurrent unprovoked DVTs and progressive macrocytic anemia. As a result, DNA sequencing was done on his blood, which found the somatic mutation (pMet14Leu) on the UBA1 gene characteristic of VEXAS syndrome. Reanalysis of his previous bone marrow found multiple vacuoes in the cytoplasm of the myeloid and erythroid precursor cells, which are part of the VEXAS syndrome.
Conclusion: To our knowledge, this is the first case of VEXAS described in Ontario and rheumatologists should be aware of its various clinical phenotype.

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TNF-α Inhibitors in the Treatment of Neurobehçet Syndrome: A Case Series and Literature Review

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Objectives: Behçet's syndrome is a systemic inflammatory endothelialopathy which can result in a variable vessel vasculitis. It is characterized by recurrent mucocutaneous ulcers, ocular disease, skin lesions, gastrointestinal involvement, neurologic disease, vascular disease and/or arthritis. Neurobehçet syndrome (NBS) occurs in 5% of cases. NBS is associated with parenchymal or vascular involvement, with parenchymal imaging changes accounting for 75-80% of cases. There is a paucity of evidence supporting treatment of NBS. Our objective was to review the course of two patients with parenchymal NBS who were treated with TNF-α inhibitors.
Methods: Two cases of NBS treated first line with TNF-α inhibitors are presented.
Results: Case 1. A 28-year-old Chinese male with a prior left midbrain and pons ischemic stroke (February 2020) and right basal ganglia intracerebral hemorrhage (January 2021) presented to the outpatient rheumatology clinic with new visual symptoms in June 2021. Ophthalmologic evaluation revealed retinal vasculitis with periphlebitis. Cerebrospinal fluid (CSF) revealed increased cells but negative for typical and atypical infection. Further history revealed intermittent oral ulcers since childhood. HLA-B*51 was positive. He was diagnosed with NBS and started on pulse methylprednisolone, azathioprine, and adalimumab. At 4 months, his disease remains in remission, with improvement of ocular inflammation. Repeat CSF analysis

demonstrated normalization of cell count and protein.
Case 2. A 45-year-old Caucasian female with suspected Behçet's syndrome presented to hospital with dyspnea, anemia and diplopia. A few weeks prior, she started azathioprine, which was thought to be the cause of anemia and was held. She described a history of intermittent oral and vaginal ulcers. Physical exam confirmed oral ulcers, ulcerating cutaneous lesions, and cranial nerve 6th palsy. CT PE revealed multiple bilateral pulmonary embolisms. MRI brain revealed cranial nerve VI enhancement and bilateral pontine enhancing lesions. CSF analysis demonstrated elevated protein with normal cell count. HLA-B*51 was negative. She was diagnosed with NBS and started on pulse methylprednisolone and infliximab 5 mg/kg IV. Treatment response is too premature to assess at time of abstract submission.
Conclusions: NBS is a rare manifestation of an uncommon disease. Parenchymal NBS may be treated with glucocorticoids and azathioprine, however TNF-α inhibitors may be considered in those with severe or refractory disease, and ongoing studies may provide additional insight into their utility. We summarize the case series evidence for treatment of NBS with TNF-α inhibitors in Table 1.

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The Devil in the Details

Matthew Anacleto-Dabarno (McGill University, Montreal); Elizabeth Hazel (McGill University, Montreal)

Case presentation: A 78-year-old female ex-smoker with a past medical history of bronchiectasis and osteoporosis presents to a community hospital with 4 weeks of intermittent cough, scant hemoptysis, and fatigue. She had significant muscle wasting. Initial investigations were significant for elevated inflammatory markers, elevated high-sensitivity troponins, microscopic hematuria, and hyponatremia consistent with syndrome of inappropriate anti-diuretic hormone. Imaging showed multiple bilateral pulmonary cavitary lesions, and right perihilar mass encasing the right upper lobe bronchus. Previous imaging was significant for biapical sub-centimetric nodules which with no interval follow-up. The patient was treated and investigated for infectious etiologies before undergoing positron-emission tomography and transthoracic needle biopsy to exclude malignancy. Late in her hospital course, the patient developed bilateral lower extremity palpable purpura. This prompted measurement of creatine which had not been verified serially as it was normal in her early hospital course. After a near-tripling of the patient's creatinine, she was transferred to an academic center for renal biopsy. The patient died shortly after arrival having been started on treatment for presumptive ANCA vasculitis. An autopsy was performed which showed extensive multi-organ granulomatous necrosis involving the gastrointestinal tract, myocardium, kidneys, uterine and left ovarian tissue, bilateral lungs, skin, liver, spleen and adrenal glands. The cause of death was extensive Granulomatosis with Polyangiitis (GPA).
Discussion: This case presents several unusual features of GPA. While subglottic stenosis is well described in ANCA vasculitis (1-3) radiological encasement of the proximal airway tree is more commonly associated with malignancy. Encasement of other anatomical structures (4) and endobronchial disease (1, 5, 6) have been described, but remain uncommon findings in GPA or ANCA vasculitis more broadly. The distribution of organ involvement is also unusual, particularly ovarian disease and splenic involvement, which have both been only rarely described (7-9). The case also presents diagnostic pitfalls that in this case, may have contributed to a significant adverse outcome. There is a well-known inverse relationship between muscle mass and serum creatinine (10) that lead to false reassurance of the patient's renal function. An initial

absence of extrapulmonary disease and several clinical and radiological features indicating malignancy caused vasculitis to be overlooked as a potential diagnosis until evidence mounted in its support. This is an example of a "premature closure" cognitive bias, a common and problematic error in judgment in medicine (11-13).

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A Systematic Review and Meta-Analysis of Models to Predict the Diagnosis of Giant Cell Arteritis

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Objectives: The diagnosis of giant cell arteritis (GCA) can be difficult in individuals with inconclusive symptoms and inflammatory markers. Temporal artery biopsy (TAB), while often thought of as the gold standard, may miss a proportion of diagnoses. As such, many diagnostic models incorporating various predictors have been developed to assist clinicians in predicting a diagnosis of GCA with varying utility. This systematic review seeks to analyze these models to understand common and stable predictors of a diagnosis of GCA, understand their rigor, and determine how different criteria can alter the diagnosis of GCA.

Methods: We performed a literature from January 1990 to May 2020 for studies that used a model to diagnose giant cell arteritis. Studies with models that had fewer than three variables or 30 people were excluded. Abstract screening, data extraction, and risk of bias were performed by two independent reviewers for each study. Study characteristics, patient characteristics, method of and criteria for diagnosis, and model details were extracted and summarized. Meta-analysis of individual signs and symptoms was performed using generic inverse variance. The PROBAST tool was used to assess risk of bias in each individual study.

Results: We screened 1 446 abstracts and included 34 studies using data from 11 countries. 42 diagnostic models were identified. A total of 13 388 patients, 12 570 TABs, and 3 718 diagnoses of GCA were included. 22 studies required TAB positivity to diagnose GCA, 7 diagnosed using a composite of clinical and investigative findings, and 4 only required clinical findings. Rates of diagnosis of GCA were 25.0%, 39.0%, and 44.9% in each group respectively; Rates of TAB positive diagnoses was 98.2%, 53.7%, and 69.8%. There were 82.9% more diagnoses of GCA when using composite criteria over TAB positivity alone. Jaw claudication and Temporal changes were most associated with a diagnosis of GCA, however there were more predictive of TAB positive GCA than a clinical diagnoses, whereas headache and vision loss were more associated with non-TAB based diagnoses of GCA. studies were at high risk of model bias and 4 were low risk.

Conclusion: Models used to predict a diagnosis of GCA are of variable methodological quality and are largely dependent on using TAB positivity as a gold standard for a diagnosis of GCA. Despite this, predictors of GCA are consistent. Future models should focus on validation and use diagnostic standards that include composite criteria that reflect current practice.

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Probable Hughes-Stovin Syndrome Presenting with Recurrent Massive Hemoptysis

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Background: Vasculitic syndromes like Behcet's syndrome can cause pulmonary aneurysms

and thrombosis. However, isolated pulmonary vascular manifestations without other features of systemic vasculitis may suggest a rarer diagnosis of Hughes-Stovin syndrome (HSS) that carries high mortality. We report a case of probable HSS presenting with recurrent massive hemoptysis.
Case: An otherwise healthy 32-year-old man presented with pleurisy and dyspnea secondary to left-sided pulmonary embolisms with parenchymal infarcts. Despite oral anticoagulation, he developed progressive and ultimately massive hemoptysis. He was afebrile and hemodynamically stable. Computed tomography (CT) of the chest revealed progressive left-sided pulmonary embolisms and a 39-milimetre ill-defined soft-tissue mass surrounding a dilated lingular segmental artery and left lower lobe pulmonary artery. Review of his imaging confirmed several left-sided pulmonary arterial aneurysms. Several surgical biopsies of the mass were negative for malignancy but showed non-specific inflammation. Abdominal CT imaging was negative for other masses. He developed recurrent hemoptysis despite changes in anticoagulation.
Further investigations revealed an elevated C-reactive protein (86 mg/L), anemia, thrombocytosis, and normal liver enzymes and renal function. Infectious workup was unremarkable including blood cultures and viral serology. Antiphospholipid antibody and inherited thrombophilia testing were negative, and he had no peripheral thrombosis. He had no other systemic features of connective tissue disease or vasculitis, and autoimmune serology including anti-neutrophil cytoplasmic antibodies was unremarkable.
For probable HHS, the patient received induction therapy with high-dose intravenous methylprednisolone followed by oral prednisone and 6 doses of monthly cyclophosphamide. Full-dose anticoagulation was stopped after consultation with a thrombosis specialist. The patient's hemoptysis resolved, and his pulmonary aneurysms improved on repeated imaging. Azathioprine was used for maintenance therapy and the patient completed a prednisone taper. He subsequently developed a new pulmonary embolism, requiring re-induction with high-dose prednisone and transition from azathioprine to methotrexate and infliximab.
Discussion: Our case adds to 57 published cases of HSS, a possible variant of Behcet's syndrome primarily affecting young men. Clinical manifestations include arterial or venous thrombosis and pulmonary vasculitis manifesting as pulmonary arterial aneurysms or pseudoaneurysms with in-situ thrombosis. Bronchial arterial aneurysms can occur, and aneurysmal wall enhancement on CT imaging may identify underlying vasculitis. Following the European League Against Rheumatism's recommendations for pulmonary vasculitis in Behcet's syndrome, treatment of HSS requires high-dose glucocorticoids and cyclophosphamide due to high mortality. Tumor necrosis factor alpha inhibitors may be considered in refractory cases. Our case supports observations that early recognition and aggressive immunosuppression may improve outcomes in HSS.

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Giant Cell Arteritis with Recurrent Strokes: A Case Report and Review of Literature

Angela Hu (University of British Columbia, Vancouver)

Giant cell arteritis (GCA) resulting in strokes is an infrequent (3-5%) complication. We present a challenging case with severe occlusive disease and recurrent cerebrovascular events despite immunosuppression.
Ms. F is a 70F who developed cranial GCA symptoms in April 2021 (severe headache, scalp tenderness, fevers and polymyalgia rheumatica symptoms). In August she had right eye blurriness and came to ED. CRP 41mg/L (N <3). CTA arch to vertex showed severe mural thickening and multifocal stenoses throughout bilateral vertebral arteries, and diffuse irregularity

and mild stenosis of intracranial arteries. She was started on low dose ASA, methotrexate 20mg SC weekly and 3 days of IV pulse steroids, with subsequent slow taper. Ophthalmological examination was normal. She had a temporal artery biopsy on Aug 10, results consistent with GCA.

She returned Sept 14 with left arm weakness, dysarthria and right perioral numbness, consistent with transient ischemic attack (TIA). Repeat CTA head/neck showed progression of severe bilateral stenoses of cavernous ICAs, and similar occlusion of the vertebral arteries. MRI showed acute R PICA infarct. Given this rapid progression, the changes were felt to be secondary to GCA. Her cranial GCA symptoms had resolved and CRP normalized (0.2mg/L). Another pulse of methylprednisolone was given for 5 days. The stroke team initiated anticoagulation with IV heparin, transitioned to apixaban. Sept 16 repeat CTA head/neck showed still mildly worsening stenoses in the cavernous ICAs and left intracranial vertebral artery; she also had recurrent TIA symptoms. As a result, cyclophosphamide induction per EUVAS protocol at 10mg/kg was initiated. She subsequently stabilized and was discharged Sept 22.

There is a paucity of literature for treatment of strokes related to GCA. Lower mortality is reported in patients who receive combination therapy compared to corticosteroid (CS) monotherapy (40% vs 58%, respectively). In a retrospective review of 45 patients from 2016, 69% received CS alone, 4% CS + methotrexate or azathioprine, and 18% CS + cyclophosphamide. The GiACTA trial (NEJM 2017) examined the efficacy of tocilizumab, but specifically excluded patients with recent major ischemic events such as stroke. One case report discusses a patient who initially responded to cyclophosphamide but subsequently had refractory strokes when switched to tocilizumab. Another case report describes successful treatment with tocilizumab for stroke in the internal carotid territory related to GCA.

Lack of research limits our understanding of optimal therapies in intracranial GCA. Overall experience favours use of cyclophosphamide in conjunction with corticosteroid.

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The Anatomy of Severe Neuropsychiatric Systemic Lupus Erythematosus: A Single Center Experience

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Objectives: Severe neuropsychiatric systemic lupus erythematosus (NPSLE) is one of the least characterized SLE manifestations. In this study we describe features of severe NPSLE at our institution and analyze the manifestations and outcomes according to anatomical region involved and mechanisms of disease.

Methods: This is a retrospective medical record review. Cases were identified by cross referencing ICD9/10 codes for SLE with psychosis, delirium, organic brain syndrome, seizures, CVA, aseptic meningitis, transverse myelitis, peripheral neuropathy, cranial nerve neuropathy, and lupus headache from 1990-2020. Demographics, details of SLE and NP disease, and serologies were extracted. Patients were classified by anatomic manifestations: central nervous system (CNS), peripheral nervous system (PNS), or combined CNS/PNS. Data was analyzed with NCSS 2021 software.

Results: Of the 714 records identified, a total of 26 patients fulfilled inclusion criteria. The median follow-up interval was 6 (IQR: 4,10) months. 20 had exclusive CNS, exclusive 4 PNS, and 2 had CNS/PNS (Table 1). Within CNS, 5 had demyelinating disease, 8 thrombotic, 5 vasculitis, and 10 other manifestations. Within PNS 1 had demyelinating disease, 4 had

vasculitis, and 2 had myasthenia. The median age of SLE diagnosis for the cohort was 33.68 (IQR: 26,43) years. NPSLE manifestations occurred after an established diagnosis of SLE at a median of 4 (IQR: 0,7) years. Importantly though, patients with demyelinating disease presented with CNS lesions that antedated SLE diagnosis by a median of 11 years (IQR: 0,22). Overall, 80.8% of our cohort required hospitalization. Most CNS patients (85%) required hospitalization with 25% of them, admitted to the ICU. Both categories received pulse steroids; however, CNS patients received higher doses on average. Cyclophosphamide was administered to less than half of our patients. The rest were treated with a variety of antimetabolites, IVIG, and interferon in patients with demyelinating disease. Remission within the follow up interval was achieved in only 21% of CNS and 25% of PNS patients.
Conclusion: Most patients with severe NPSLE presented several years after being diagnosed with SLE, apart from those with demyelinating disease who generally presented before establishing a diagnosis of SLE. Generally, patients with CNS disease had a more severe disease course, with most requiring hospital admission, high dose steroids, and immune suppression. Clinical remission was achieved in a small minority of patients, a fact that calls for rigorous studies on prevention and treatment of this severe complication of SLE.

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Hospitalizations for COVID in Canadian SLE Patients Followed in Clinical Cohorts in the Pre-vaccination Period.

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Objectives: To capture the number of serious COVID cases (defined as those requiring hospitalization) reported in pre-vaccination period at five clinical SLE cohort registries in Canada.
Methods: Our study combined data from five clinical SLE cohort registries in Canada (Montreal, Quebec City, Halifax, Winnipeg, and Calgary). The cohorts enroll unselected patients aged 18 years or older who meet American College of Rheumatology (ACR) criteria for SLE. Patients are evaluated yearly and report detailed clinical information including hospitalization for any reason. We used this sampling reference to determine the number of SLE patients from these cohorts who were hospitalized for COVID from March 31, 2020 to April 1st, 2021 (which included the first and second pandemic waves). During this time in Canada, vaccination against COVID was available primarily to nursing home residents and health care workers only.
Results: During March 31, 2020 to April 1, 2021, in the Canadian cohorts there were 432 patients from Montreal, 270 from Calgary, 313 from Halifax, 234 from Winnipeg, and 126 from Quebec. Most (1242/1375, 90%) were female and in their 50s. White race/ethnicity ranged from 93.7% (Quebec City) to 53.7% (Calgary). Out of these 1,375 Canadian SLE patients followed in clinical cohorts, no hospitalizations for COVID had been recorded between March 31, 2020 and April 1, 2021. Potential limitations: These data are limited by the fact that these represent only patients from academic centres, and we relied on active reporting of patients to their physicians, in combination with annual assessments of (all-cause) hospitalization, which may have missed

some events. Also, we are focused on COVID hospitalizations, not COVID infections, which did occur in some cohort members over this period. Our findings may not reflect COVID infections in the post-Delta variant era.
Conclusion: These data are interesting to consider given contrasting findings of COVID hospitalizations in SLE patients (in US and other jurisdictions) during the first wave(1) of the pandemic. Differences may in part be due to variations in race/ethnicity, urban-versus-rural residence, health care access, and potentially clinical variables (e.g. drugs, disease control). As well, sociological differences (e.g. public and personal health measures and other factors) are likely important. Despite the very limited nature of these data, they provide a snapshot of hospitalizations for COVID in Canadian SLE patients followed in clinical research cohorts in the pre-vaccination period. (1) https://onlinelibrary.wiley.com/doi/full/10.1002/art.41450

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SARS-CoV-2 Seroprevalence, Seroconversion and Neutralizing Antibodies in a Systemic Lupus Erythematosus Cohort and Comparison to Controls

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Objectives: At the outset of the SARS-CoV-2 pandemic, it was speculated that systemic lupus erythematosus (SLE) patients may be at significant risk of COVID-19 due to underlying immune dysregulation and immunosuppressive therapies. We examined the prevalence of SARS-CoV-2 antibodies, RT-PCR positivity, and neutralizing antibodies in a local SLE cohort prior to vaccination compared to controls.
Methods: Pre-pandemic serum samples biobanked prior to 01/01/2020 and intra-pandemic samples collected from 03/15/2020-01/31/2021 were tested for SARS-CoV-2 antibodies using an ELISA measuring IgA and IgG anti-spike 1 (S1) protein (Euroimmun AG, Lübeck, Germany) and an assay detecting IgG antibodies to nucleocapsid (N), S1 receptor binding domain (RBD), and S1 (Luminex Corporation, Austin, TX). 100 pre-pandemic and 148 intra-pandemic sera (i.e., 248 unique individuals) from unselected ambulatory individuals undergoing autoantibody testing served as controls. Pre-pandemic and intra-pandemic SLE and control samples with antibodies to at least one SARS-CoV-2 antigen were tested for neutralizing antibodies using the Surrogate Virus Neutralization Test (GenScript Biotech Corporation, Piscataway, NJ). RT-PCR tests were performed on the SLE cohort if clinically indicated and results retrospectively collected until 01/31/2021.
Results: 173 SLE patients were included (94.8% female, mean age 48.5 years, 83.2% prescribed hydroxychloroquine, 28.9% corticosteroids, and 43.9% other immunomodulators). None of the SLE patients had pre-pandemic SARS-CoV-2 antibodies versus 6% of controls (difference -6.0%, 95%CI: -10.7%, -1.4%; Table). Comparable proportions of SLE patients and controls had at least one intra-pandemic SARS-CoV-2 antibody (3.5% versus 4.7%, difference -1.2%, 95%CI: -5.6%, 3.2%). Intra-pandemic seroprevalence of anti-N IgG in SLE patients was lower than in the general population (Calgary, AB) over a similar observation interval (0.6% vs 2.9%, difference -2.3%, 95%CI: -3.6%, -1.0%). 7.5% (6/80) of SLE patients had a positive RT-PCR. None of the nine SLE patients with either intra-pandemic SARS-CoV-2 antibodies and/or positive RT-PCR were hospitalized. Two of six SLE patients with at least one SARS-CoV-2 intra-pandemic antibody developed neutralizing antibodies; both had anti-RBD IgG antibodies.

None of six pre-pandemic and 4/7 intra-pandemic controls with at least one antibody to SARS-CoV-2 had neutralizing antibodies.
Conclusion: Our SLE cohort had a lower rate of seropositivity pre-pandemic and a slightly lower to similar rate of seropositivity intra-pandemic compared to controls. It is unclear which factors influence SARS-CoV-2 infection in SLE, but as no pre-pandemic SARS-CoV2- IgG antibodies were observed in our SLE cohort, this seems an unlikely explanation for protection against COVID-19. Future efforts should focus on vaccine responses in SLE.

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Screening for Cognitive Impairment with the Automated Neuropsychological Assessment Metrics in Patients with Systemic Lupus Erythematosus

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Objectives: The American College of Rheumatology Neuropsychological Battery (ACR-NB) is the standard screening test for cognitive impairment (CI) in systemic lupus erythematosus (SLE). While the ACR-NB is validated for classifying definite, indeterminate, or non-CI, the Automated Neuropsychological Assessment Metrics (ANAM) is an accessible alternative for the ACR-NB. Since one third of SLE patients are classified as indeterminate CI in practice and didn't be considered in previous study, our objectives in this study were to: (i) identify ANAM subtests predictive of CI, (ii) develop an initial approach for classifying definite, indeterminate, or non-CI, (iii) evaluate performance relative to the ACR-NB.
Methods: 211 adult SLE patients were given the ACR-NB and ANAM on the same day at a single center in 2016-2018. The ACR-NB scores across the 6 domains are standardized by age and gender to define CI as: definite: z-score $\leq$ -1.5 in $\geq$ 2 domains, indeterminate: z-score $\leq$ -1.5 in 1 domain, or non: z-scores in all domains > -1.5. The ANAM has 7 domains with 15 subtests scored with the mean reaction time (MR), percentage correct responses (PCT), the coefficient of variation of the MR (CV), and/or throughput (TH). To classify ACR-NB CI status with the ANAM subtests, we fit 6 models with all subtests: 4 with one score each, one with MR, CV, and PCT, and one with MR, CV, PCT, and TH. In each setting, we fit a proportional odds cumulative logit model with the adaptive elastic net penalty using the log transformed ANAM subtest scores. The penalized fitting identifies relevant subtests by shrinking coefficients of irrelevant subtests to zero. Performance estimates relative to the ACR-NB were obtained with weighted 3-fold cross-validation.
Results: The best performing model included the MR, CV, and PCT scores. The selected 36 subtest scores are presented in Table 1. Overall accuracy for classifying the ACR-NB CI status is: 33.8% for non-CI, 41.2% for indeterminate, and 77.4% for definite. The model performs well for definite CI compared to ACR-NB. Used as a screening test for CI relative to indeterminate or non-CI, the model has a sensitivity of 0.62 (95% confidence interval: 0.48, 0.76), specificity of 0.72 (0.60, 0.88), and area under the curve of 0.76 (0.69, 0.80).
Conclusion: This is the first study to evaluate the ANAM in discriminating definite, indeterminate, and non-CI in a real world SLE population. The ANAM holds promise as a CI screener and warrants further assessment.

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The New EULAR/ ACR 2019 SLE Classification Criteria: A Predictor of Long-term

Outcomes

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Objectives: We recently demonstrated that a EULAR/ACR classification Criteria score ≥ 20 predicts a higher disease activity throughout the first 5 years after diagnosis. A score of 20 was used as a threshold based on ROC analysis. We aimed to determine the ability of a EULAR/ACR score ≥20 to predict damage accrual and mortality.

Methods: 867 SLE patients from the Toronto Lupus Clinic were included (all recruited in the first year after diagnosis). For each patient, the EULAR/ACR score was calculated based on baseline information. Patients were divided into 2 groups depending on their score <20 or ≥20. The following outcomes were assessed: - Time to first damage accrued: First increase in SDI from 0 to ≥ 1 within the first 10 years after SLE diagnosis. - Time to any increase in damage: Any increase in the SDI within the first 10 years after SLE diagnosis. - Time to death within the first 10 years after SLE diagnosis. - Mean SDI score at the 10th year of follow-up.

Results: Of 867 patients included, 87.5% were woman. At baseline the mean age was 36.2 years, the mean disease duration was 0.2 years and the mean SDI score was 0.1, which was the same for both groups (p=0.13). The proportion of patients who accrued damage within the first 10 years was significantly higher in the group with the higher score, 46% vs 40%, score ≥20 vs < 20 respectively (p=0.02). On multivariable regression analysis, after adjusting for age and ethnicity, a score ≥ 20 continued to significantly predict accrual of first damage and any increase in SDI throughout the first 10 years of follow-up. (Table 1). The mean SDI at 10 years was significantly higher in the group with a score of ≥ 20, 1.28 vs 0.97, score ≥20 vs < 20 respectively (p=0.03). When looking at the specific domains, the group with a score ≥ 20 at the 10th year had significantly more renal damage (p=0.006) and a higher percentage of diabetes (p=0.01). In total 68 patients (7.8%) died within the first 10 years of follow-up. The percent of deaths was higher in the group with a score ≥ 20, 9.7% vs 5.8% score ≥20 vs < 20 respectively (p=0.03). Individuals in the group with a score of ≥20 had twice the probability of dying (Table 1).

Conclusion: A EULAR/ACR score ≥20 is a predictor of damage accrual and mortality in SLE.

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Factors Associated With Employment and Work Disability in Patients With SLE: A Nested Case-control Study

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Objectives: Systemic lupus erythematosus (SLE) can range in severity, resulting in some patients being unable to continue working while others can remain employed. This study aimed to analyze and compare factors including disease activity between work disabled and employed SLE patients to elucidate variables associated with unemployment.

Methods: This is a cross-sectional study focused on the status of last employment reported on 1110 adult SLE patients followed at a single centre where 746 patients were categorized as "Employed" and 364 as "Unemployed" (work disability or Sick Leave). In the employed group, 478 patients were matched to 297 patients in the unemployed group by 2:1 matching based on gender, inception status (first seen at clinic within 12 months of SLE diagnosis), disease duration at last visit (+/- 3 years), ethnicity (Caucasian/non-Caucasian) and education level. Associations between variables and employment status were assessed using univariable and multivariable logistic regressions in a nested case-control study. Greedy matching algorithm was used to assemble cases and controls. Patients' characteristics were compared by paired t-test and McNemar's test, and a logistic regression was performed to examine patients' demographics, disease activity, organ damage, disease burdens and treatment to the last employment status. Step-down variable selection method was adopted in the multivariable model building with Akaike Information Criterion (AIC) used as the model fitting statistics.
Results: Of the 775 patients those in the unemployed group showed significantly greater disease activity (higher adjusted mean SLEDAI-2K and SLEDAI-K Glucocorticoid index (SLEDAI-2KG) in the past five years and greater damage (by SDI). Patients were found to have a significantly higher prevalence of myocardial infarction, stroke, fibromyalgia, hypertension, and higher daily and cumulative glucocorticoid use. In the multivariable analysis (Table 1), age at SLE diagnosis (OR, 95% CI: 1.04,1.02-1.06), adjusted mean SLEDAI-2KG in past five years (OR, 95% CI: 1.07, 1.03-1.12), SDI (OR, 95% CI: 1.59, 1.40-1.80) and fibromyalgia (OR, 95% CI: 3.84, 2.52, 5.86) were associated with the increased risk of unemployment. Additional modeling where adjusted mean SLEDAI-2KG was substituted by adjusted mean SLEDAI-2K and cumulative glucocorticoid dose in the past five years, showed similar results to the previous model.
Conclusion: High disease activity, damage and use of glucocorticoids were associated with an increased likelihood of patients being unemployed. Similarly, fibromyalgia was strongly associated with a patient being unemployed. Employment status may be improved by better control of SLE disease activity and management of fibromyalgia and other risk factors.

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Cerebral Vasculitis as an Initial Presentation of Systemic Lupus Erythematosus

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A previously healthy 29-year-old Black male presented to hospital with a 3-day history of fever, and a 1-day history of vomiting, ataxia and right sided weakness. Laboratory investigations showed hemolytic anemia (Hb=81g/l), severe thrombocytopenia (PLT=6000/µl), lymphopenia (300/µl) and acute kidney injury (creatinine=263umol/l); the remaining tests were normal. Brain MRI showed a left frontal intracranial mass (diameter 4.2cm) with extensive vasogenic edema causing a 1-cm rightward midline shift. After 24 hours, the patient had a rapid decline in his level of consciousness following an episode of emesis and an urgent CT scan revealed an intralesional hemorrhage.

He underwent a decompressive craniotomy and evacuation of the hemorrhage. Pathology from a brain biopsy showed fibrinoid necrosis, perivascular and transmural mononuclear infiltration (predominantly T cells and macrophages), consistent with vasculitis.

His autoimmune profile was positive for antinuclear antibodies, anti-dsDNA antibodies (559 IU/ml, normal range<10), positive anti-Sm, anti-SSA/Ro and anti-RNP antibodies.

Antiphospholipid antibodies (including lupus anticoagulant, anticardiolipin and anti-b2GPI antibodies) were negative. A diagnosis of deficiency of adenosine deaminase 2 (DADA2) was ruled out with urine purine and pyrimidine.
The patient was diagnosed with cerebral vasculitis secondary to systemic lupus erythematosus (SLE). He was treated with intravenous pulses of glucocorticoids (methylprednisolone 1000mg/day for 3 consecutive days), cyclophosphamide (750mg/m2 of body surface area) and hydroxychloroquine 400mg daily. His level of consciousness, renal function, anemia and thrombocytopenia improved rapidly, and he was discharged after 2 weeks without any residual neurologic deficits.
Cerebral vasculitis is a rare manifestation of SLE, with a post-mortem incidence of < 10%. Symptoms range from headache to psychosis or seizures. While imaging modalities can be helpful in the diagnosis, brain biopsy remains the gold standard. This case report highlights this rare SLE manifestation and the successful treatment with corticosteroids and cyclophosphamide.

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A Rare Case of Scleroderma Renal Crisis in a Patient with Systemic Sclerosis-Systemic Lupus Erythematosus (SSc-SLE) Overlap

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Objectives: Scleroderma (systemic sclerosis; SSc) is an immune disorder characterized by inflammation, vasculopathy, and fibrosis. Scleroderma has high morbidity and mortality, often cited to have reduced quality of life (1). There are associated complications including scleroderma renal crisis (SRC). SRC occurs in 5% of patients with SSc and is characterized by malignant hypertension and acute renal failure (2). Futhermore, increased age at scleroderma onset is strongly associated with cancer risk (3).
In an already rare disease entity, there is a cohort of people who also have an overlap syndrome with systemic lupus erythematous (SSc-SLE). Little is known about the epidemiology, clinical characteristics and survival of these patients. We aim to describe a case of an 82 year old female who presented with scleroderma renal crisis and rapidly progressive diffuse SSc with features meeting EULAR/ACR classification criteria for SLE.
Methods: We obtained informed consent from the patient's Power of Attorney for the use of photography and description of the patient's case, omitting any identifiers, for educational purposes.
Results: Our patient presents to hospital with hypertensive emergency, chest pain, and shortness of breath. She had multiple bloodwork abnormalities including hemolytic anemia and thrombocytopenia, as well as elevated cardiac enzymes, prompting admission. The question of scleroderma was raised when a trainee recognized the characteristic skin tightening and digital ulcers. Rheumatologic assessment concluded that she had rapidly progressive diffuse SSc with significant skin tightening in the hands, arms past the elbows, chest, and lower limbs, digital ulcers, and dilated nailfold capillaries. She was diagnosed with Raynaud's phenomenon three years ago but only started to have skin tightening in the last three months. During this time, she also had sicca symptoms, dysphagia, and oral ulcers.
During admission, captopril was promptly initiated with other antihypertensives. Other investigations yielded an organized pericardial effusion, pleural effusion, and ascites. Her blood work was significant for strongly positive ANA 1:1280, Scl70, anti-RNP/Anti-Smith, Anti-Ro 52. She had low complements and creatinine of 500 umol/L with oliguria.
She met the ACR EULAR classification criteria for SSc, as well as the EULAR/ACR criteria for

SLE. In a bid to avoid dialysis, the decision was made to initiate oral cyclophosphamide, as pulsed prednisone would likely exacerbate her SRC.
Conclusion: Rapidly progressive diffuse scleroderma with SLE overlap carries a poor prognosis as therapeutic decisions are not clear cut. In addition, late age of presentation is worrisome for underlying malignancy.

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Early Systemic Sclerosis: Mitochondria, Fatigue and Fibromyalgia

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Objectives: Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) and Fibromyalgia (FM) are commonly described in patients with systemic sclerosis. Previous studies have not described this in patients with early Systemic Sclerosis (eSSc) (< 2 years of disease onset, without skin fibrosis). There are also no biomarkers that can distinguish patients with CFS/ME from patients with FM. To address this, we aimed to assess the frequency of mitochondrial transcripts in different patient groups.
Methods: All eSSc patients met the 2013 ACR/EULAR classification criteria. Rates of ME/CFS, FM, anxiety, depression and sleep disturbances were assessed through validated questionnaires. Expression of various mitochondrial electron transport chain (ETC) genes from blood was determined through qPCR. Relative frequency of oxidative phosphorylation was estimated by measuring the proportion of active (dephosphorylated) pyruvate dehydrogenase (PDH) in PBMCs which reflects its activity, and the rate limiting step controlling aerobic respiration.
Results: We found 48% of our eSSc patients fulfilled the diagnostic criteria for ME/CFS, with 75% of those patients having co-morbid FM. eSSc patients with fatigue were not distinguishable from idiopathic FM patients based on clinical evaluation for ME/CFS ($p=1.0$) and FM ($p=0.2$). eSSc patients with fatigue could be distinguished from FM patients through ETC gene analysis. Expression of ND4 ($p=0.002$) and CyB ($p=0.04$) were reduced in eSSc and Cox7C elevated ($p=0.04$) when compared to FM patients. Relative oxidative phosphorylation frequencies, as measured by the ratio of phosphorylated Pyruvate Dehydrogenase/Pyruvate Dehydrogenase, was not found to be significantly different between the disease groups.
Conclusion: A large proportion of eSSc patients suffer from co-morbid ME/CFS and FM. These symptoms may be linked to a novel mitochondrial signature affecting the efficiency of the electron transport chain. Further studies are needed to determine whether functional loss is also evident. These findings may lead to the development of pivotal clinical interventions for eSSc patients suffering from ME/CFS and FM and a deeper understanding. Funding: Our work was supported by an unrestricted research grant from Boehringer Ingelheim through an unrestricted investigator-initiated study, the Dutch Kidney Foundation (17PhD01); and Arthritis Society (19-0558).