

## **TOUR1A**

### **Comparative Analysis of Hospital Admissions and Costs for Psoriatic Disease, Inflammatory Bowel Disease and Both Conditions in Newfoundland – a JanI-Hip Study**

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**Methods:** A retrospective analysis was conducted using data from the Newfoundland and Labrador Centre for Health Information (NLCHI) spanning from 2009 to 2019. Patients diagnosed with PsD were identified using the ICD-9 code 696 and matched with a control group of approximately 75,500 individuals who did not have PsD. From this cohort of around 100,000 patients, those with IBD were identified using ICD-9 codes 555 for Crohn's disease (CD) and 556 for ulcerative colitis (UC). Data on the number of hospital admissions and total hospitalization costs were collected from the NLCHI database.

**Results:** A total of 15,100 patients were identified with PsD, and 2,800 patients had IBD. Among these cohorts, 14,368 had PsD alone, 2,068 had IBD alone, and 732 had both conditions. Thus, 4.8% of PsD patients were also diagnosed with IBD, comprising 525 patients (3.4%) with CD and 207 patient (1.4%) with UC. The mean number of admissions for patients with both IMIDs was significantly greater at 6.08 over a ten-year period, compared to 3.09 for those with PsD alone ( $p < 0.0001$ ) and 5.04 for those with IBD alone ( $p < 0.001$ ). The total hospitalization costs over ten years for patients with both conditions amounted to \$21,814, significantly higher than the \$10,742 for PsD alone ( $p < 0.001$ ), and numerically, though not statistically, higher than the \$17,767 for IBD alone ( $p = 0.09$ ). Similar numerical trends were observed in hospitalizations primarily due to cardiovascular-related events, with costs for both diseases at \$2,476 compared to \$1,622 for PsD alone and \$1,987 for IBD alone. For mental health-related hospitalizations, the cost was \$3,931 for both conditions compared to \$1,886 for PsD alone and \$3,560 for IBD alone.

**Conclusion:** These findings highlight the necessity for targeted healthcare strategies that address the complexities of managing multiple IMDs. By focusing on integrated care approaches and efficient resource allocation, healthcare systems can better support patients with these overlapping conditions, ultimately reducing the economic burden and improving patient outcomes.

## **TOUR1B**

### **Unmet Workplace Accommodation Needs and Work Outcomes Across Sectors in Individuals with Systemic Sclerosis**

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**Methods:** We conducted a cross-sectional study of people with SSc. Using a standardized questionnaire, trained research assistants conducted telephone interviews collecting information about demographics, disease characteristics, work context, support and accommodation availability, needs and use, disclosure of health needs to supervisors. Workplace outcomes included presenteeism, job disruptions and absenteeism. Linear regressions examined the association of unmet accommodation needs with workplace outcomes.

**Results:** There were 210 participants (80.9% women) with SSc with 10.5 (SD 8.2) mean years disease duration. Most (n=151, 73.0%) worked full time. Participants worked in education, science, arts, or research (n=75, 35.7%); government, financial, technology, business (n=67, 31.9%); sales, retail, or services (n=40, 19.1%); and utilities, construction, or manufacturing (n=28, 13.3%). Forty-five percent of respondents reported unmet workplace support needs. Participants working in sales, retail or services had the highest proportion of unmet needs (60.0%) compared to those working in government, financial, technology or business (40%). Participants working in government, banking, or insurance who reported unmet needs had significantly higher job disruption scores (on average 1.35 points higher) and higher presenteeism scores (on average 1.26 points higher) than those without unmet needs. Among participants in education, science, arts, or research those with unmet needs reported presenteeism scores (averaging 1.52 points higher). Participants in sales, retail, or service roles with unmet needs had presenteeism scores averaging 2.03 points higher than those without unmet needs. Disclosure of the diagnosis of SSc to supervisors did not differ significantly between those with and without unmet needs.

**Conclusion:** In general, unmet workplace accommodation needs were associated with job productivity across different job sectors. Unmet needs in the sales, retail or services sector appear to be greater than in the government, financial, technology or business sector. To support the productive employment of people with SSc, interventions should target workplace support needs across different job sectors.

## **TOURIC**

### **Perceptions of Rheumatologists on Barriers and Enablers to Adoption of Interdisciplinary Models of Rheumatology Care in Ontario, Canada**

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**Methods:** We conducted a qualitative study using semi-structured interviews with rheumatologists practicing in Ontario, Canada, whose primary practice was a conventional model of care (without IHPs). Participants were purposively sampled to ensure variation in gender, career stage, practice setting, and region. The interview guide was informed by the Theoretical Domains Framework (TDF), an implementation framework used to identify

determinants of health-professional behaviour. We used content analysis with deductive coding to TDF domains and inductively derived within-domain themes on factors influencing adoption of interdisciplinary care.

**Results:** We interviewed 14 rheumatologists across Ontario (12 adult, 2 paediatric), of whom 9 were women (64%) and 8 were aged <40 (57%). We identified six TDF domains as relevant to rheumatologists' adoption of interdisciplinary care (Table 1), with barriers and enablers varying by anticipated IHP scope/function. Participants described being optimistic they would be able to feasibly implement an interdisciplinary model with appropriate system supports (1-Optimism) and reported strong self-efficacy for training and supervising IHPs (2-Beliefs about capabilities). Participants perceived that adoption would benefit patients (improved access/equity through shorter wait times, better care coordination, improvements in health outcomes) and rheumatologists (reduced administrative workload and burnout), which they identified as key enablers (3-Beliefs about consequences). Funding was described as the primary system-level barrier. For some, limited physical space to accommodate an IHP was reported to further impede adoption. Participants perceived a shortage of suitably trained IHPs, particularly outside urban centres, as a major barrier to adoption. They anticipated that the substantial time required to train new team members, and the risk of turnover, could create non-recoverable training costs and discourage implementation (4-Environmental context and resources). Rheumatologists reported knowledge gaps regarding IHP training and scope, along with limited business and human-resources skills for recruitment and contracting, as barriers to adoption (5-Knowledge, 6-Skills).

**Conclusion:** Among rheumatologists currently practicing in a conventional care model, we identified behavioural determinants of adopting an interdisciplinary model of care. To overcome barriers and strengthen enablers, sustainable funding, workforce development (IHP training), practical implementation resources (business guidance and training), and clear blueprints of successful care models and IHP roles (set-up guidance, team compositions, workflows) are required.

## TOUR1D

### **Health Care Utilization Patterns Among Patients Presenting to Emergency Department for Gout Flares in Ontario, Canada: a Population-Based Retrospective Observational Study**

Timothy Kwok (Division of Rheumatology, Department of Medicine, University of Toronto, Toronto); Samantha Morais (ICES, Toronto); Ping Li (ICES, Toronto); William Silverstein (Division of General Internal Medicine, University of Toronto, Toronto); Clare Atzema (Division of Emergency Medicine, University of Toronto, Toronto); Gregory Choy (University of Toronto, Toronto); Priyanka Chandratre (Division of Rheumatology, University of Ottawa, Ottawa); Jessica Widdifield (Sunnybrook Research Institute, ICES, University of Toronto, Toronto)

**Methods:** We performed a population-based retrospective study, identifying the annual number of gout ED visits occurring between 2014 to 2023 in Ontario. Annual total and incident ED gout visits and rates were determined, then stratified by sex and age. We described clinical and sociodemographic characteristics and assessed patient-level health care usage factors both preceding and after the gout ED visit. Repeat ED presentations and hospitalizations were determined within 90-days. Among individuals aged  $\geq 66$  years, we further assessed dispensations for flare abortive medications, urate lowering therapy and opioids within a 30-day window.

**Results:** The mean age of individuals presenting to ED was 59.7 (SD 16.4), and 77.5% were male. Between 2014–2023, there were 125,505 gout ED visits in Ontario, including 86,824 incident visits. Annual ED gout encounters peaked in 2018 (14,017 encounters) translating to an annual crude rate of 0.99 (95% CI: 0.97–1.01) and male stratified annual rate of 1.56 (95% CI: 1.53–1.59) visits per 1000-persons (Figure 1). Older adults had the highest ED visit rates at 3.01 (95% CI: 2.89–3.15) visits per 1000-persons in 2015. Patients were highly comorbid with 55.5% of patients with  $\geq 10$  Aggregated Diagnosis Groups. Common comorbidities included hypertension (57.7%) and diabetes (24.0%). By 30-days post-ED encounter, 28.3% and 21.3% patients were dispensed a flare abortive medication or attended an ambulatory gout visit respectively, while 10.3% were dispensed an opioid. By 6-months, 38.1% of patients had serum urate testing. By 90-days, 29.9% of encounters led to ED re-presentation, with 9.4% of total encounters representing specifically for gout, culminating in 6.2% (1.5% for gout) of total encounters leading to hospital admission. Findings were comparable for incident ED gout visits. **Conclusion:** In what is one of the first Canadian population-based assessments of acute care use for gout, our work suggests that there is a large burden of ED visits, with suboptimal post-ED health services use, marred by under-prescribing of flare medications, over-prescribing of opioids and high acute care representation rates. Quality improvement efforts should be directed at strategies to prevent upstream ED presentations for gout and enhancing appropriate follow-up care.

## TOUR2A

### Post-Translational Modifications of Neutrophil Proteases Shape Fibroblast-Like Synoviocyte Responses in Rheumatoid Arthritis

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**Methods:** Primary human FLS were cultured and stimulated with native or PTM-modified neutrophil proteases. Cytokine and chemokine secretion (IL-6, IL-1 $\beta$ , TNF- $\alpha$ ) was quantified by ELISA and Olink multiplex analysis. Protease-activated receptor (PAR) signaling was assessed using PAR2 inhibitors and phospho-ERK immunoblotting. Serum autoantibody reactivity to citrullinated PR3 was evaluated in RA patients and at-risk relatives.

**Results:** FLS exposed to PTM-modified neutrophil proteases showed markedly elevated secretion of IL-6, IL-1 $\beta$ , and TNF- $\alpha$  compared with unmodified controls. (1A.) This activation was significantly reduced by PAR2 inhibition, implicating a PAR2–ERK signaling axis in FLS inflammatory activation. (1B.) Flow cytometric analysis demonstrated rapid ERK phosphorylation following cit-PR3 stimulation, peaking at 15 minutes—much stronger than responses to PR3. (1C.) Western blot confirmed prolonged pERK1/2 activation after cit-PR3 treatment, which was reduced by PAR2 blockade. (1D.) Olink proteomic profiling revealed that cit-PR3 shifted the FLS secretome toward a pro-inflammatory, immune-recruiting phenotype, with upregulation of CXCL1, CXCL5, CCL2, CCL3, and enrichment of granulocyte chemotaxis and cytokine-mediated response pathways. PCA distinguished cit-PR3–treated FLS from PR3, reflecting distinct secretome remodeling. (1E-H.) Time-course analysis showed persistent IL-6 elevation up to 24 h, consistent with chronic synovial activation. (1I.) Autoantibody profiling further revealed stepwise increases in anti-cit-PR3 IgG from ACPA– relatives to ACPA+ relatives to RA patients, linking PR3 modification to early autoimmune responses. (1J.)

Together, these findings identify cit-PR3 as a potent driver of FLS inflammatory signaling and a potential early biomarker for RA.

**Conclusion:** Our findings establish PTM-modified neutrophil proteases as potent modulators of FLS behaviour and contributing amplification of inflammation and autoimmunity in RA. These translational findings will be critical in developing targeted therapies that modulate dysregulated neutrophil function and pathogenic PTMs—broadening the therapeutic arsenal, preventing early disease onset, and ultimately improving patient quality of life.

## **TOUR2B**

### **Novel Diagnostic and Prognostic Urinary Biomarker Model for Lupus Nephritis and Renal Anca-Associated Vasculitis**

Sajida Alkadri (University of Calgary, Calgary); Miriam Li (University of Calgary, Calgary); Kim Cheema (University of Calgary, Calgary); Daniel Muruve (University of Calgary, Calgary); Yvan St-Pierre (McGill University Health Centre, Montreal); Ashley Clarke (University of Calgary, Calgary); Paul Sciore (Mitogen Diagnostics Laboratory, Calgary); Marvin Fritzler (Mitogen Diagnostics Laboratory, Calgary); May Choi (University of Calgary, Calgary)

**Methods:** Urine samples and kidney biopsy data were from the Biobank for Molecular Classification of Kidney Disease from patients with LN (n=14), rAAV (n=10), and healthy controls (n=10). Samples ranged from 14 days pre-biopsy to 238 days post-biopsy. Biomarker levels were quantified using ELISA (usCD163, sC5b9, SIGLEC-1) and Meso Scale Discovery (C3a, C5a) assays, and normalized to urine creatinine levels. Mean concentrations were compared between groups, logistic regression generated a combined model, and receiver operating characteristic (ROC) curves assessed performance in predicting complete renal remission (CRR; UPCR<300mg/g).

**Results:** UsCD163 and urine-protein creatinine ratio (UPCR) levels were significantly elevated in patients with LN ( $17.92 \pm 14.09$  and  $241.21 \pm 74.41$  mg/mmol, respectively) and rAAV ( $4.27 \pm 2.03$  and  $90.87 \pm 30.40$  mg/mmol, respectively) compared to healthy controls ( $0.13 \pm 0.01$  and  $7.53 \pm 1.67$ , respectively), whereas uCAPs and SIGLEC-1 were not. There was a strong positive correlation between UPCR and usCD163 ( $\rho=0.886$ ,  $p<0.001$ ), and moderate correlations with C3a ( $\rho=0.642$ ,  $p<0.001$ ), C5a ( $\rho=0.588$ ,  $p<0.001$ ), and sC5b9 ( $\rho=0.566$ ,  $p<0.001$ ). SIGLEC-1 concentrations showed no significant correlation with UPCR ( $\rho=0.181$ ,  $p=0.31$ ). A combined model including usCD163 and uCAPs achieved strong predictive performance for distinguishing patients who achieved complete renal remission from those who did not (AUC=0.91; Figure 1). Among individual biomarkers, usCD163 had the highest discriminative performance (AUC=0.96), while sC5b-9 had the lowest (AUC=0.74; Figure 1).

**Conclusion:** Urinary biomarkers reflecting distinct aspects of renal immune activation have potential to non-invasively monitor disease activity in LN and rAAV. Our findings support usCD163 as an indicator of renal inflammation, correlating closely to disease activity and remission status. A combined model with uCAPs and UPCR improved diagnostic performance further, capturing key immunologic differences in disease pathogenesis. Further validation in a larger, longitudinal cohort is underway.

## **TOUR2C**

### **Mif Deficiency Disrupts Epithelial Defense and Metabolic Pathways in the Ileum of Skg**

## **Mice**

Shaghayegh Foroozan Borojeni (University Health Network, Toronto); Mansi Aparnathi (University Health Network, Toronto); Zoya Qaiyum (University of Toronto, Toronto); Akihiro Nakamura (Department of Medicine, Queen's University, Kingston); Nigil Haroon (Department of Medicine/Rheumatology, University Health Network, Schroeder Arthritis Institute, University of Toronto, Toronto)

**Methods:** Single-cell RNA sequencing (Flex Gene Expression) was performed on FFPE ileal samples from SKG wild-type (WT), WT+Curdlan, MIF knockout (MKO), and MKO+Curdlan mice (n=2 per group). UMAP clustering, differential gene expression, and Gene Ontology (GO) analyses were used to assess cellular composition and biological pathways related to immune activation, epithelial integrity, and metabolism.

**Results:** Distinct transcriptional and cellular changes were observed across groups. Curdlan treatment induced expansion of neutrophil and macrophage populations in both WT and MKO mice. Compared to WT, MIF deficiency led to reduced enterocyte, goblet cell, and Paneth cell populations, indicating epithelial compromise. Under steady-state conditions, GO analysis revealed that MIF deletion caused loss of pathways associated with bacterial defense, epithelial secretion and transport, and epithelial differentiation, consistent with impaired mucosal defense. Upon curdlan challenge, MIF deficiency further suppressed oxidative phosphorylation, mitochondrial electron transport, and ATP synthesis pathways, indicating metabolic dysfunction in the inflamed gut epithelium.

**Conclusion:** These findings highlight MIF as a critical regulator of intestinal epithelial homeostasis. In its absence, mice exhibit loss of antimicrobial defense and epithelial function under basal conditions, and marked impairment of mitochondrial and respiratory metabolism upon inflammatory stimulation, collectively predisposing to gut inflammation and barrier breakdown.

## **TOUR2D**

### **Dysregulation of the Cancer-Associated Glycan Polysialic Acid in Systemic Sclerosis: a Novel Biomarker and Anti-Fibrotic Target**

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**Methods:** We measured polySia levels in sera from 22 patients with SSc using a specific polySia ELISA and correlated polySia levels with the severity of skin fibrosis using the modified Rodnan skin score (mRSS). We also used primary dermal FB from skin biopsies of healthy controls (HC, age/sex matched), less severe limited cutaneous SSc (lcSSc), dcSSc and post-ASCT patients (N=4-6/per group) and measured the frequency of DSBs, active (nuclear) FOXO1, and polySia

levels using immunofluorescence/confocal microscopy and/or immunoblot (IB). We also quantified polySia, ST8SIA2 levels or pro-fibrotic markers (fibronectin and CTGF) using qRT-PCR and/or IB following FOXO1 pharmacological inhibition, ST8SIA2 knockdown via siRNA, or treatment with a polySia elongation inhibitor, 8-keto-Neu5Ac.

**Results:** Total polySia levels correlated with mRSS ( $p=0.007$ ,  $\rho=0.560$ ) in SSc patients – highlighting its direct link with fibrosis in SSc. We also observed that FB from dcSSc had a 2-3-fold induction in polySia levels and ST8SIA2 expression compared to FB from lcSSc and age/sex matched HC ( $p=0.02$ ). Importantly, post-ASCT FB had a substantial reduction in ST8SIA2 ( $p=0.04$ ) and polySia levels. This was associated with increased DSBs and FOXO1 activation exclusively in dcSSc FB. Finally, FOXO1 inhibition, ST8SIA2 siRNA knockdown, or treatment with 8-keto-Neu5Ac resulted in a 1.9-fold reduction in pro-fibrotic markers and total polySia levels (Figure 1).

**Conclusion:** Our study identifies a novel DSB/FOXO1/polySia pathway as a key driver of fibrosis in SSc. This axis may serve as a biomarker for disease progression and may be indicative of restoration of FB functions post-ASCT. We postulate that targeting the FOXO1/polySia pathway may provide a novel therapeutic approach in dcSSc.

### TOUR3A

#### **Biological Sex-Related Differences in Radiographic Progression and Relationship with Early Clinical Response: Post Hoc Analysis of a Phase 3, Randomized, Double-Blind, Placebo Controlled Study in Biologic-Naive Participants with Active Psoriatic Arthritis Treated with Guselkumab**

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**Methods:** Biologic-naïve pts with active PsA were randomized (1:1:1) to GUS 100 mg every 4 weeks (Q4W); GUS 100 mg at W0, W4, then Q8W; or placebo with crossover to GUS 100 mg Q4W at W24. Early (W8) response in joint DA, (based on clinical DA Index for PsA [cDAPSA LDA;  $\leq 13$ ]), was assessed among pts with cDAPSA  $>13$  at BL, without adjustment for sex-specific differences at BL. Multivariate repeated measures mixed models assessed associations between sex and changes in total PsA modified van der Heijde-Sharp [vdH-S] score through W100 (Fig 1).

**Results:** Of 739 PsA pts enrolled, 47.5% were female. At BL, female vs male pts were more likely to have dactylitis (60.6% vs 50.3%;  $p=0.0049$ ), and on average had higher BMI (29.5 vs

28.4 kg/m<sup>2</sup>;  $p=0.0144$ ), lower CRP levels (1.6 vs 2.3;  $p<0.0001$ ), less severe psoriasis (Psoriasis Area and Severity Index [PASI] score: 7.5 vs 12.1;  $p<0.0001$ ), and more functional disability (Health Assessment Questionnaire-Disability Index [HAQ-DI] score: 1.4 vs 1.2;  $p<0.0001$ ). BL cDAPSA (46.1 vs 46.4) and PsA-modified vdH-S (26.2 vs 25.5) scores were similar ( $p>0.05$ ) between sexes. In unadjusted analyses of GUS-treated pts, male sex was associated with greater progression of structural damage through W100 ( $\Delta$ LSM=1.02;  $p=0.0260$ ). After adjusting for risk factors of RP, BL characteristics with sex-specific differences in the pooled cohort, disease duration and non-biologic DMARD use at BL, the difference between sexes in RP decreased but remained significant ( $\Delta$ LSM=0.90;  $p=0.0406$ ); LSM changes from BL in PsA-modified vdH-S scores in males vs females were 1.36 vs 0.69 ( $p=0.0502$ ) at W52 and 2.22 vs 1.10 ( $p=0.0475$ ) at W100 (Fig 1). Early (W8) cDAPSA LDA was achieved by 18.9% of men vs 15.3% of women. In men, this was associated with significantly less RP through W100; in females only, numerical differences were observed.

**Conclusion:** These results confirm the independent association of male sex with more rapid RP. The previously reported relationship between early improvement in joint DA and diminished RP[1] was found to be stronger in males than females, which may be due to the lower rate of RP in females.

### TOUR3B

#### Assessing Genetic Factors Influencing the Variability in Psoriatic Arthritis Onset Among Patients with Psoriasis.

Kathleen Dyer (Memorial University, St. John's); Quan Li (Memorial University, St. John's); Vinod Chandran (Schroeder Arthritis Institute, Krembil Research Institute, Division of Rheumatology, Department of Medicine, University of Toronto, Toronto); Dafna Gladman (Schroeder Arthritis Institute, Krembil Research Institute, Toronto Western Hospital, University Health Network, University of Toronto, Toronto); Proton Rahman (Division of Rheumatology, Craig L. Dobbin Genetics Research Centre, Discipline of Medicine, Memorial University of Newfoundland, St. John's)

**Methods:** A total of 703 patients from the Gladman Krembil PsA program were analyzed, with ages at psoriasis and PsA onset recorded. All samples underwent a genome-wide association scan that included over one million single-nucleotide polymorphisms (SNPs). Quality control excluded SNPs with more than 1% missing data and those that did not meet Hardy-Weinberg equilibrium criteria. We treated the age difference between PsA and psoriasis onset as a quantitative trait by subtracting the age at PsA onset from the age at psoriasis onset for each patient. We then performed a quantitative trait locus (QTL) analysis. PsA patients were categorized into four groups and compared for genetic differences: (A) PsA occurring at least one year before psoriasis; (B) psoriasis and PsA occurring within one year of each other; (C) PsA occurring one to ten years after psoriasis; and (D) PsA starting ten or more years after psoriasis onset.

**Results:** The QTL analysis identified over 50 SNPs significantly affected the onset of inflammatory arthritis ( $p < 1 \times 10^{-5}$ ). Most identified loci were associated with a delay in PsA onset in individuals with the mutant allele compared with those with the wild-type allele. Genes associated with delayed PsA included PSORS1C1, CDSN, TXB5, and OSBLV. Conversely, loci on chromosome 15 (in linkage disequilibrium with MYO1E) and chromosome 17 (in LD with CCDC43 and MEIOC) were associated with an earlier onset of PsA. Comparisons among the

PsA onset subsets noted above revealed notable differences, particularly between groups A and D (59 SNPs) and between groups A and C (30 SNPs) at a significance level of  $p < 1 \times 10^{-5}$ . Development of polygenic risk scores to identify early- and late-onset PsA is ongoing.

**Conclusion:** This study underscores the significant role of genetic mutations in influencing the variability in the onset of PsA among patients with psoriasis. By identifying over 50 SNPs that significantly impact the timing of PsA onset, our findings highlight the complex genetic landscape that contributes to progression from psoriasis to PsA.

### **TOUR3C**

#### **Incidence of Inflammatory Arthritis Before and After Inflammatory Bowel Disease**

##### **Diagnosis: a Population-Based Cohort Study**

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**Methods:** We used population-based health administrative data from Ontario, Canada to identify all incident IBD cases diagnosed between April 1, 2003 and March 31, 2020 using previously validated age-specific algorithms. Among individuals in this inception cohort of IBD patients, we identified individuals diagnosed with IA either before or after their IBD diagnosis. IA diagnosis (rheumatoid arthritis, axial spondylitis, other seronegative spondyloarthropathies, synovitis) required  $\geq 1$  hospitalization or emergency department visit or  $\geq 2$  physician claims with an IA diagnosis code, with  $\geq 1$  claim made by a rheumatologist (adult or pediatric), internal medicine physician, pediatrician, or gastroenterologist. IA diagnoses could occur at any point during data availability (1991-2024). We calculated the time between the diagnoses of IA and IBD, categorizing time into the intervals ( $>3$  years pre-IBD diagnosis to  $>10$ -15 years post-IBD diagnosis). Age- and sex-standardized IA incidence rates were calculated within each interval. Analyses were stratified by IBD type, age at IBD diagnosis ( $<18$ y, 18 to 64y,  $\geq 65$ y), and sex.

**Results:** We identified 56,776 individuals with incident IBD; 11,814 (20.8%) had an IA diagnosis. The incidence of IA peaked in the 6 months prior to IBD diagnosis (23.1 (95% CI 18.6 to 28.4) per 1000 person-years), then gradually decreased in the time following IBD diagnosis (Figure). This pattern was consistent in all subgroups.

**Conclusion:** This is the first population-based study to describe the incidence of IA in an inception cohort of people with IBD. The peak in IA diagnosis around the time of IBD diagnosis indicates a need for integrated interprofessional care models to facilitate patient access to both gastroenterology and rheumatology care. Future research will investigate the implications of these co-occurring diagnoses on health services utilization and expenditures.

### **TOUR3D**

#### **Phonophoresis for Enthesitis-Related Pain: Real-World Outcomes from a Retrospective Single-Centre Study**

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(CArE), Newmarket); Leya Bennet (Centre of Arthritis Excellence (CArE), Newmarket)

**Methods:** This retrospective single-centre study included patients treated with phonophoresis using fluocinonide 0.05% gel between November 2023 and May 2025. Patients were offered six sessions over 2–3 weeks, with some receiving adjunctive dry needling or corticosteroid injections before treatment. Data extracted from the QHR Accuro EMR included demographics, rheumatic and musculoskeletal diagnoses, treatment details, inflammatory markers (when available), Visual Analogue Scale (VAS) pain scores, patient-reported outcomes, physical assessments, and adverse effects related to phonophoresis. A clinically meaningful improvement was defined as a  $\geq 2$ -point reduction in VAS from baseline to the final session.[1] Subgroup analyses compared outcomes by anatomical site, adjunctive therapy use, and overall course duration.

**Results:** A total of 32 treatment courses were administered to 27 patients (mean  $\pm$  SD age  $59 \pm 13$  years; 81% female). Thirteen (48.1%) were receiving disease-modifying antirheumatic drugs (DMARDs), and two (7.4%) were on biologics at the time of treatment. Across 47 anatomical sites with paired VAS data, the mean VAS reduction ( $\Delta$ VAS) was  $3.18 \pm 2.71$ , with 70.2% achieving clinically meaningful improvement. The Achilles tendon was the most frequently treated site ( $n = 24$ ), with 62.5% of these sites achieving meaningful improvement, followed by the plantar fascia ( $n = 9$ , 66.7%) and peroneal tendon ( $n = 5$ , 100%) (Table 1). Sites treated with phonophoresis plus adjunctive dry needling ( $n = 19$ ) demonstrated higher response rates compared to sites treated with phonophoresis alone (89.5% vs 58.6%) and greater pain reduction ( $\Delta$ VAS =  $3.71 \pm 2.37$  vs  $2.81 \pm 2.90$ ). Four patients received corticosteroid injections prior to phonophoresis (three intramuscular and one site-specific), with a mean  $\Delta$ VAS of 3.75 following phonophoresis and 75% showing clinically meaningful improvement. Most patients completed  $\geq 6$  sessions within approximately 4–5 weeks. Phonophoresis was well tolerated, with only one mild, self-limiting adverse event reported.

**Conclusion:** Phonophoresis was associated with clinically meaningful pain reduction across most anatomical sites, with adjunctive dry needling further enhancing outcomes. This non-invasive, well-tolerated treatment modality could serve as a useful adjunct for localized enthesitis-related pain, especially in patients unable to receive corticosteroid injections or for whom standard therapies are not ideal.

## TOUR4A

### Cross-Provincial Validation of a Giant Cell Arteritis Case-Identification Algorithm Using Alberta Health Data

Tosin Ogunleye (University of Calgary, Calgary); Claire Barber (University of Calgary/Arthritis Research Canada, Calgary); Lillian Barra (Western University/ Lawson Health Research Institute, London); Aurore Fifi-Mah (University of Calgary, Calgary); Stephanie Garner (University of Calgary, Calgary)

**Methods:** We conducted a chart review to validate an Ontario administrative case-identification algorithm for GCA,[1] against the ACR/EULAR GCA Classification Criteria (2022),[3] within Southern Alberta. Our study included patients aged 50 and older diagnosed with GCA from January 1, 2018, to December 31, 2023 in Alberta. We began by applying Ontario's algorithm for GCA to a linked Alberta health-administrative dataset to produce a subset of algorithm-positive cases. This pool was further sampled to generate a random selection of 100 cases within Southern Alberta for chart review. This sample size was calculated using the Wald method and

assumed a 95% confidence level, a 5%-10% margin of error, and an expected positive predictive value (PPV) of 81.3% similar to Ontario findings. The 2022 ACR/EULAR GCA classification criteria served as our reference standard and reflected the current GCA diagnostic consensus.[3] As a sensitivity analysis, PPV was also computed using the treating rheumatologist diagnoses as an alternative reference standard. PPV was calculated as True Positives (TP) divided by the number of algorithm-positive charts (n = 100).

**Results:** 1,903 algorithm-positive cases were identified in Alberta using the Ontario case definition and 100 were randomly selected for chart review. When evaluating the performance of the Ontario algorithm in the Southern Alberta cohort (n = 100), the case-definition yielded a PPV of 64% (95% Confidence Interval [CI]: 54.6% - 73.4%). In the sensitivity analysis, the Ontario administrative case-definition algorithm produced comparable estimates when validated against rheumatologist diagnoses as the alternative reference standard (PPV: 62%, CI: 52.5% - 71.5%).

**Conclusion:** The Ontario administrative case-definition algorithm demonstrated moderate PPV in the Southern Alberta cohort (64%; 95% CI: 54.6% - 73.4%), which was lower than the Ontario cohort estimate (81.3%; 95% CI: 73.4 - 89.1%).[1] The confidence intervals showed minimal overlap, with the upper limit of our CI approaching the lower limit of the Ontario estimate, suggesting possible, but limited, agreement between cohorts. Differences may reflect potential regional or methodological differences including, reference standard selection across studies and sample size. Refinement of the algorithm may improve its performance in Alberta.

## **TOUR4B**

### **Systemic Sclerosis in the Elderly. Comparison of Disease Manifestation, Comorbidities, and Survival in Geriatric Systemic Sclerosis.**

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**Methods:** A total of 2,303 patients fulfilling ACR/EULAR classification criteria for SSc were included, comprising 1,976 EoSSc and 327 LoSSc cases. The primary outcome was all-cause mortality from the time of diagnosis, while secondary outcomes included disease-specific manifestations, comorbidity burden, and functional status. Relative risks (RR) with 95% confidence intervals (CI) were calculated for clinical and serological features. Survival analyses were performed using Kaplan-Meier estimates and Cox proportional hazards modeling to identify independent predictors of mortality.

**Results:** LoSSc patients exhibited distinct clinical characteristics compared with those with earlier onset disease. They were significantly less likely to demonstrate esophageal dysmotility (RR 0.91, 95% CI 0.85–0.97), digital ulcers (RR 0.65, 95% CI 0.53–0.81), or anti-Scl-70 antibody positivity (RR 0.68, 95% CI 0.51–0.91), suggesting a lower prevalence of classic fibrotic and vasculopathic features. In contrast, LoSSc patients demonstrated a higher prevalence of pulmonary arterial hypertension (RR 1.59, 95% CI 1.33–1.89) and a substantially greater

burden of age-associated comorbidities, including coronary artery disease, systemic hypertension, diabetes mellitus, hyperlipidemia, peripheral vascular disease, malignancy, stroke, and atrial fibrillation. Functional impairment was also more pronounced, with LoSSc patients more frequently classified as NYHA class II or higher (RR 1.50, 95% CI 1.17–1.92). The risk of multimorbidity was strikingly elevated, with LoSSc patients demonstrating a 27-fold increased likelihood of having six or more comorbid conditions. Survival analyses revealed significantly higher mortality in LoSSc at one, five, and ten years post-diagnosis (figure 1). Late-onset disease was an independent predictor of mortality (adjusted HR 4.51,  $p < 0.0001$ ), even after adjustment for key confounders including sex, cardiovascular comorbidities, interstitial lung disease, pulmonary hypertension, renal crisis, and malignancy.

**Conclusion:** These findings indicate that LoSSc constitutes a clinically and prognostically distinct phenotype, characterized by increased comorbidity, higher cardiopulmonary complications, and reduced survival. Tailored approaches to screening, management, and prognostication are warranted for older adults with systemic sclerosis.

## TOUR4C

### Validation of the Health Assessment Questionnaire Disability Index in Immune Checkpoint Inhibitor-Induced Inflammatory Arthritis

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**Methods:** Patients with ICI-IA enrolled in the Canadian Research Group of Rheumatology in Immuno-Oncology (CanRIO) multicenter prospective cohort who completed a baseline HAQ-DI were included. Demographic, clinical and laboratory data were extracted from the study database. Internal consistency reliability was assessed using Cronbach's alpha coefficient ( $\geq 0.7$  acceptable). Construct validity was examined by correlating HAQ-DI scores with other measures of disease activity. Responsiveness was evaluated using the standardized response mean (SRM) and effect size (ES) among participants with  $\geq 3$ -point improvement on physician global assessment of disease activity (defined a priori) at 6 month follow up.

**Results:** Ninety-six patients from nine centers were included, 48 female, median age 67 years (range 39–84) with most common malignancies being melanoma (25%) and non-small cell lung cancer (20%). Polyarticular involvement was most frequent (64%) with median tender and swollen joint counts of 6 (range 0–36) and 2 (range 0–30), respectively at baseline. 54% of participants were on systemic glucocorticoids at baseline. Median HAQ-DI was 0.5 (range 0, 3)

at baseline and 0.125 (range 0, 2.375) at 6 months (n=66). HAQ-DI scores were higher in those not on immunosuppression (median 0.5 vs 0.375). Floor and ceiling effects were 24% and 1%, respectively. Cronbach's alpha ranged from 0.72-0.91 across the eight HAQ-DI domains and was 0.94 for the 20 individual items, suggesting high internal consistency. The HAQ-DI had a significant positive correlation with C-reactive protein, swollen joint count, patient global score and physician global score (Table 1). In those with  $\geq 3$ -point improvement on the physician global score at follow-up (n=23), responsiveness was moderate (SRM =1.4; ES = 0.3).

**Conclusion:** In this prospective cohort study, the HAQ-DI was reliable, valid and sensitive to change in patients with ICI-IA. Over 50% of patients were on baseline immunosuppression likely impacting HAQ-DI scores and responsiveness to change assessment. Future research will explore content validity, the minimal clinically important difference in this population, and correlation to the physical functioning components of cancer-specific patient-reported outcome measures.

#### **TOUR4D**

##### **Mortality in Anca-Associated Vasculitis: a Retrospective Study from a Tertiary Vasculitis Center**

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**Methods:** We conducted a retrospective study of 21 deceased patients with GPA or MPA followed in our vasculitis center between 2001 and 2022. Clinical characteristics, treatment regimens, organ involvement, infections, and causes of death were extracted from medical records. Cumulative prednisone doses were estimated and described in relation to outcomes.

**Results:** Among the 21 patients included, 67% had GPA and 33% had MPA. The median follow-up was 986 days. Renal and/or pulmonary involvement occurred in most patients. While 50% of patients had active vasculitis at death, infection was the most common cause of death (52%), exceeding vasculitis-related mortality (19%) (Figure 1). Patients who died from infection had received higher cumulative prednisone doses (median 10.2 grams[g], IQR 4.9–14.1g) than those who died from other causes (median 5.6 g, IQR 2.5–28.3g). Long-term glucocorticoid use was associated with metabolic complications and repeated infections.

**Conclusion:** Infections, rather than active vasculitis, were the leading cause of death in our cohort. These findings underscore the need for individualized immunosuppressive regimens, judicious steroid tapering, and proactive infection risk mitigation in the management of AAV. Future studies should aim to identify predictors and preventive measures of infection-related mortality, while optimizing steroid-sparing strategies.

#### **TOUR5A**

##### **Rare Genetic Lupus Risk Variants and Long-Term Outcomes in Childhood-Onset Systemic Lupus Erythematosus**

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Dominguez (Division of Rheumatology, The Hospital for Sick Children, Toronto); Zhaoyu Ding (The Hospital for Sick Children, Toronto); Anjali Jain (The Hospital of Sick Children, Toronto, Ontario); Deborah Levy (Division of Rheumatology, The Hospital for Sick Children; Child Health Evaluative Sciences, SickKids Research Institute, Toronto); Andrea Knight (Division of Rheumatology, Hospital for Sick Children, Toronto, Canada, Toronto); Linda Hiraki (Division of Rheumatology, Hospital for Sick Children, Toronto, Canada, Toronto)

**Methods:** We conducted a cohort study of patients with cSLE followed at The Hospital for Sick Children (2016 – 2024) who underwent whole-exome or whole-genome sequencing. Variants were assessed using our internal pipeline with quality-control and depth filters. A predefined gene list (36 monogenic lupus genes) was expanded to include genes with established roles in lupus-relevant immune dysregulation. Rare, potentially pathogenic variants were defined as those with minor allele frequency <1% in gnomAD (Genome Aggregation Database) and predicted deleterious by  $\geq 2$  in-silico tools with biologic plausibility. Patients harboring  $\geq 1$  qualifying variant were classified as variant-positive. Demographic, clinical, treatment and outcome data were abstracted from the dedicated Lupus database, supplemented by chart review. This included ACR/EULAR (American College of Rheumatology/European Alliance of Associations for Rheumatology) classification criteria, SLE manifestations, SLEDAI-2K (Systemic Lupus Erythematosus Disease Activity Index 2000) and SLICC-ACR (Systemic Lupus International Collaborating Clinics) damage index scores prospectively collected over time. We also documented complications such as macrophage activation syndrome (MAS) and hospitalizations. We compared the prevalence of irreversible organ damage or major complications, between ‘variant-positive’ and ‘variant-negative’ patients adjusting for demographic and clinical covariates.

**Results:** 151 children and adolescents with cSLE had genome-wide sequencing during the study period; 84% were female, with a median age at diagnosis of 12.8 years (IQR 10.3–15.2). Preliminary review suggests that variant-positive patients are diagnosed at younger age and frequently exhibit classical lupus serology and hypocomplementemia. Identified variants spanned canonical monogenic-lupus pathways, including complement genes (e.g.: C1QA), nucleases and nucleic-acid sensing (e.g.: DNASE1L3), immune tolerance/lymphoproliferation (e.g.: CTLA4), and X-linked genes (eg: SAT1). Preliminary review suggests phenotypic heterogeneity across these genetic subgroups with possible differences in treatment intensity and healthcare utilization; full statistical evaluation is ongoing.

**Conclusion:** In a diverse cohort of children and adolescents with cSLE, and an expanded list of SLE risk genes, we anticipate at least 13% carry rare pathogenic SLE variants. We expect these patients are more likely to sustain irreversible organ damage compared to those who do not carry rare variants. Our findings will extend our understanding of cSLE and improve prognostication.

## **TOUR5B**

### **a Pilot Study of the Ifn Transcriptome in Children with Lyme Arthritis**

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**Methods:** Study participants with LA were recruited prospectively from a pediatric rheumatology clinic in Halifax, NS. Clinical outcomes were divided into those with resolution

of arthritis with 1-2 courses of antibiotics and PILA. Oligoarticular JIA and healthy volunteers served as comparator groups. Reverse-Transcription quantitative Polymerase Chain Reaction (RT-qPCR) of mRNA isolated from peripheral blood mononuclear cells was analyzed to evaluate the expression levels of Type I IFN (IFNA1) and Type I IFN responsive genes (ISG15, IFIT1, OAS1) to create a Type I IFN score, and IFNG as a representative Type II IFN. Standard housekeeping genes ACTINB and UBC were used as reference genes. Fold changes in gene expression within groups were analyzed using the Wilcoxon-signed-rank test, and differences between groups with T-tests.

**Results:** Results. Research cohorts included: 28 antibiotic responders (57%F, age  $8.5y \pm 3.4y$ ), [19 had resolution after 1 course of antibiotics, 9 after 2 courses], 5 with PILA (75%F, age  $10.4y \pm 1.3y$ ), 5 with JIA (100%F, age  $6.8y \pm 4.0y$ ) and 18 healthy controls (43%F,  $8.3y \pm 4.9y$ ). Significant expression of IFNA1, ISG15, IFIT1, and OAS1 ( $p < 0.0001$ ) and IFN score ( $p < 0.0001$ ) was observed within the antibiotic responder group, while PILA and JIA groups failed to demonstrate a measurable IFN response. Analysis between groups demonstrated significantly higher IFNA1 expression in the antibiotic responder group compared to PILA ( $p = 0.015$ ).

**Conclusion:** Conclusions. Our data suggest that robust IFN expression is associated with antibiotic response and disease resolution in children with LA; however, a low IFN signature after Borrelia exposure is associated with persistent joint inflammation despite antibiotics, similar to oligoarticular JIA. Our study is limited by the small number of patients in the PILA group, with sample collection ongoing.

## TOUR5C

### **Vista-Jia: Feasibility and Preliminary Effectiveness of a Virtual Self-Management Randomized Controlled Trial in Adolescents with Juvenile Idiopathic Arthritis**

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**Methods:** This study is part of a multicenter randomized controlled trial (RCT). [2] We report data from one of five sites, which recruited 20 participants randomized to a remote intervention or a wait-list control group. Participants ( $n = 10$ ) in the remote SMP attended four 60–90-minute ZOOM sessions (JIA overview, daily living and exercise, coping strategies, and

treatment/lifestyle management) over eight weeks. Both groups completed questionnaires at baseline (T0) and after the intervention group completed the program (T1). The questionnaires included: (1) the Medical Issues, Exercise, Pain, and Social Support (MEPS); (2) the Children's Arthritis Self-Efficacy Scale; (3) the Pediatric Quality of Life Inventory 3.0 Rheumatology–Teen Module; (4) the PROMIS (Patient-Reported Outcomes Measurement Information System) Pediatric Pain Interference Scale; and (5) the Readiness for Adult Care in Rheumatology (RACER). After completing the program, participants in the intervention group were invited to take part in an optional semi-structured interview to provide feedback. Mann–Whitney U tests compared groups change scores, standardized effect sizes were calculated, and qualitative feedback was analyzed thematically.

**Results:** Attendance was high, with 80% of participants completing all sessions. 95% completed the baseline and post-intervention questionnaires, and five also participated in the optional interview. Participants indicated they would attend again and think other teens would be interested. Feedback highlighted peer connection and the educational value of the sessions. Some participants felt that the sessions were too long, and responses were mixed regarding interactivity. Compared with the control group, the intervention group showed a significant improvement in MEPS ( $p = 0.027$ ) with a large effect size ( $r = 0.51$ ). Improvements in the RACER ( $p = 0.053$ ) and the Self-Efficacy Scale ( $p = 0.11$ ) trended toward significance, with moderate effect sizes of 0.44 and 0.37, respectively.

**Conclusion:** This pilot study supports the feasibility and acceptability of a virtual self-management program for adolescents with JIA. The program improved self-management outcomes and showed trends toward greater transition readiness and self-efficacy. These preliminary results warrant further multi-site evaluation to confirm effectiveness and optimize engagement. Recruitment is ongoing across sites, with a target enrollment of 100 participants.

## **TOUR5D**

### **Unsupervised Clustering of Whole Blood Gene Expression Treatment Naïve Children and Adolescents with Childhood-Onset Systemic Lupus Erythematosus.**

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**Methods:** Participants were diagnosed and followed in a tertiary care Lupus clinic and met SLE classification criteria. Clinical and laboratory data including disease activity and damage indices were prospectively collected and stored in a dedicated database. Participants were genotyped on a multi-ethnic array and ancestry was genetically inferred. Whole blood was collected prior to treatment initiation with glucocorticoids or other potent immunosuppressants, and whole blood

transcriptome wide RNA-sequencing was completed. We identified distinct participant clusters based on gene expression profiles using K-means clustering. Clinical and demographic feature differences between clusters were assessed using ANOVA and Fishers exact test. To gain an understanding of the genes driving cluster membership predictive modeling was used. Logistic LASSO regression and random forest supervised models were deployed and the genes most used by the models to aid in prediction of cluster membership were extracted.

**Results:** The cohort included 75 children and adolescents with cSLE with RNA-sequencing on treatment naïve whole blood samples. Initial K-means plots identified three clusters and one outlier which was excluded resulting in the final cohort. The group was 81% female with a median age of SLE diagnosis of 13.8 years (IQR: 12.1, 15.4). The demographic compositions of each cluster did not yield any statistically significant differences. Clusters differed significantly in the proportion of individuals with hypocomplementemia (C3 and/or C4) (Cluster 1= 40%, Cluster 2= 35%, Cluster 3= 100%,  $P < 0.01$ ), fever (Cluster 1= 55%, Cluster 2= 13%, Cluster 3= 40%,  $P < 0.01$ ), and Anti-Smith antibodies (Cluster 1= 70%, Cluster 2= 35%, Cluster 3= 40%,  $P = 0.01$ ). Supervised models successfully identified genes predictive of cluster membership these genes include, but are not limited to IGHG1, IGHG4, INKA2, and SLC39A12-AS1. Cluster 1 was characterized by increased expression of SKA2, ARL1, and SRP68. Cluster 2 showed decreased expression of IGHG1, IGHG4, and IGLV1-44. Cluster 3 displayed increased expression of CD177, ALPL, and SLC4A1.

**Conclusion:** In a clinically heterogeneous, multiethnic cohort of patients with cSLE, treatment naïve whole blood RNAseq genome wide expression generated three discrete clusters of patients. Genes characterizing cluster membership include IGHG1, SKA2, and CD177. Next steps include gene set enrichment analysis to denote differences in cluster biological processes.

## **TOUR6A**

### **Obinutuzumab Induces Histological Remission and Deep Kidney Parenchymal B-Cell Depletion in Patients with Lupus Nephritis: Exploratory Analyses of the Phase Iii Regency Trial**

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South San Francisco); William Pendergraft (Genentech Inc, South San Francisco); Ana Malvar (Organización Médica de Investigación, Buenos Aires)

**Methods:** Paired baseline and W76 kidney biopsies from REGENCY participants with biopsy-proven proliferative LN were analysed. Histological analysis: 64 biopsies (32 OBI+ST, 32 PBO+ST) were evaluated using the 2018 ISN/RPS LN classification, along with the NIH activity (AI) and chronicity indices. The proportion of patients achieving histological or near-histological remission (AI=0 or  $\leq 1$ ) was determined. B-cell analysis: 29 participants (14 OBI+ST, 15 PBO+ST) were assessed. CD79a+/CD138- B cells were quantified by immunofluorescence microscopy and digital whole-slide analysis. Changes in B-cell counts at W76 were compared using an ANCOVA model, adjusting for baseline B-cell counts and stratification factors.

**Results:** Baseline characteristics were balanced, despite higher tissue B-cell levels in the OBI+ST group. At W76, significantly more patients achieved AI=0 or  $\leq 1$  with OBI+ST vs PBO+ST. Among patients not achieving CRR, 52.6% (10/19) in the OBI+ST group had an AI=0 at W76, vs 8.3% (2/24) in the PBO+ST group. Most patients in the OBI+ST group had substantial drops in kidney tissue B-cell counts by W76 (Figure 1). The adjusted mean change in B-cell counts from baseline to W76 was -28.5 (95% CI, -33.3 to -23.6) for OBI+ST vs -11.9 (95% CI, -16.6 to -7.2) for PBO+ST, a significant difference of -16.6 (95% CI, -23.4 to -9.7;  $P < 0.0001$ ).

**Conclusion:** In the largest longitudinal kidney biopsy cohort ever reported for a registrational LN clinical trial, significantly more patients achieved complete or near-complete histological remission with OBI+ST vs PBO+ST. This is the first demonstration of deep kidney tissue B-cell depletion by any anti-CD20 agent, in any glomerular disease. Obinutuzumab's potent B-cell clearance from kidney tissue may drive kidney function improvement and LN flare reduction. These findings support assessment of histological outcomes in future LN trials and highlight a potential mechanism for obinutuzumab in preserving long-term kidney health.

## **TOUR6B**

### **Longitudinal Ana and Ena Dynamics in Preclinical Systemic Autoimmune Rheumatic Diseases: a Retrospective Cohort Study**

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Krembil Research Institute, Toronto, Canada. , Toronto)

**Methods:** Methods: We analyzed autoimmune serology from 225 asymptomatic ANA-positive or UCTD subjects with longitudinal follow-up (1-7 years) to assess changes over time, seroconversion, and progression to (SARD). ANAs were quantified by indirect IF using the Kallestad® HEp-2 kit and specific autoantibodies measured using the Bioplex® 2200 ANA Screening System which assesses the levels of anti-dsDNA, -chromatin, -Ro, -La, -Sm, -SmRNP, -RNP, -Jo-1, -Scl-70, -centromere and -ribosomal P antibodies.

**Results:** Results: At baseline, a high ANA titer ( $\geq 1:640$ ) predominated in 60% of subjects, with speckled and homogeneous patterns representing the majority of immunofluorescent patterns. The most prevalent baseline autoantibodies were Ro (23.3%) and RNP (15.7%). Among subjects with serial ANA testing (n=77), 60% had initial high titers ( $\geq 1:640$ ). Upon follow up, 53% had declining titers with 6.5% seroconverting to ANA-negative. Of those who seroconverted, 60% had high titers ( $\geq 1:640$ ) initially and 40% had a dense fine speckled (DFS) pattern. The median time to ANA loss was 3.3 years. Among the six subjects who ever demonstrated a DFS pattern, none of whom progressed to SARD, 33.3% converted to negative, and 33.3% transitioned to other ANA patterns. This variability underscores the dynamic but low-risk nature of DFS pattern. Among the 135 subjects with serial autoantibody profiling, Ro remained the most prevalent antibody (40%) and was usually stably elevated (89% remained persistently positive), showing minimal fluctuation over time. In contrast, RNP (17%) and dsDNA (6.7%) showed the greatest instability, with 44% of dsDNA-positive and 22% of RNP-positive subjects becoming negative. Interestingly, Scl-70, which was positive in 9 patients, also showed instability, with 4 of these patients losing positivity over time. Nine patients progressed to a defined SARD after a median of 31 months. Overall, progressors had high ANA titers ( $\geq 1:320$ ), and none became ANA-negative. Among this group, dsDNA (89%) and Ro (SSA) (56%) were the most prevalent autoantibodies.

**Conclusion:** Conclusion: Many subjects demonstrated immunological improvements. Subjects who achieved ANA negativity typically began with high ANA titers that declined over time. In contrast, progressors showed persistently high ANA titers, frequently accompanied by rising dsDNA and stable Ro reactivity. These findings support the clinical importance of serial ANA and ENA monitoring to differentiate transient autoimmunity from evolving systemic disease.

## TOUR6C

### Trajectories of Nt-Probnp in Systemic Lupus Erythematosus

Lucia Zhu (Université de Sherbrooke , Montreal); Arielle Mendel (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Montreal); Christian Pineau (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Montreal); Fares Kalache (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Montreal); Louis-Pierre Grenier (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Montreal); Thao Huynh (Montreal University Health Centre, Department of Medicine, Division of Cardiology, Montreal); Karim Sacre (Université Paris-Cité, Assistance Publique Hopitaux de Paris, Hopital Bichat, Paris); Sasha Bernatsky (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Division of Clinical Epidemiology, Montreal)

**Methods:** We analyzed demographic, clinical, and laboratory data from the McGill SLE

Research Cohort. Serum NT-proBNP levels were measured yearly from March 2022 to May 2025. We assessed the prevalence of elevated NT-proBNP ( $\geq 133$  pg/mL [1]) at baseline, and determined baseline variables: age, sex, race/ethnicity, age at SLE diagnosis, SLE duration, smoking, and SLE International Collaborating Clinics (SLICC) Damage Index. Univariate and multivariate linear regressions identified independent associations with baseline log-transformed NT-proBNP (Table 1). Patients were classified into four NT-proBNP trajectories: abnormal at baseline and remained abnormal; abnormal and normalized; normal and became abnormal; normal and remained normal. We compared baseline characteristics across trajectories using multivariate logistic regressions.

**Results:** We studied 294 patients with  $\geq 2$  measurements. At baseline, 101 (34.4%) had elevated NT-proBNP. The mean NT-proBNP levels were 243.6 pg/mL, median 91, interquartile range, IQR 55 – 171.8. Higher levels were significantly associated with female sex, white race, older age at SLE diagnosis, and longer SLE duration. Cardiovascular damage, pulmonary hypertension, and renal damage were also independently associated with higher NT-proBNP. Of the 101 individuals with abnormal baseline NT-proBNP, 79 (78.2%) remained abnormal at second assessment. Of the 193 with normal baseline levels, 30 (15.5%) became abnormal. No patient with a baseline level  $\geq 350$  normalized to  $< 133$ . Compared to other trajectories, high-risk trajectories (abnormal remained abnormal and normal became abnormal) were more likely to have cardiovascular damage (OR 3.90, 95% CI 1.49-12.48, renal damage (OR 2.87, 95% CI 1.61-5.51), and pulmonary hypertension (OR 31.99, 95% CI 4.59-651.10).

**Conclusion:** Over one-third of patients had abnormal baseline NT-proBNP, and most (78%) remained abnormal, while over 15% of those with an initially normal value became abnormal. Higher levels were associated with female sex, white race, older age at diagnosis, longer SLE duration, and organ damage. Levels  $\geq 350$  pg/mL did not normalize over our evaluation. High-risk trajectories were associated with SLICC damage items (cardiovascular damage, renal damage, and pulmonary hypertension – though the 95% CI for pulmonary hypertension was very wide). Future analyses will examine associations with electrocardiogram and echocardiographic results.

## TOUR6D

### **Predicting Work Disability in Systemic Lupus Erythematosus Patients: a Machine Learning Approach to Guide Early Clinical Intervention**

Javier Mencia Ledo (University of Toronto, Toronto); Laura Whittall Garcia (University of Toronto Lupus Clinic, Division of Rheumatology, Schroeder Arthritis Institute, Krembil Research Institute, University Health Network, Toronto, Ontario, Canada, Toronto); Dafna Gladman (Schroeder Arthritis Institute, Krembil Research Institute, Toronto Western Hospital, University Health Network, University of Toronto, Toronto); Zahi Touma (Division of Rheumatology, Schroeder Arthritis Institute, University Health Network, Toronto, Canada; University of Toronto Lupus Clinic, Toronto, Canada., Toronto); Behdin Nowrouzi-Kia (University of Toronto, Toronto)

**Methods:** We analyzed longitudinal data from 1,044 employed SLE patients at the Toronto Lupus Clinic (1996–2024). Patient reported their employment category at every clinical visit and were categorized into three exclusive outcomes: WD (permanent or prolonged sick leave), SLE-mortality, and stable employment (actively employed or retiring at/after Canadian retirement age). A Random-Forest classifier selected visit-to-visit disease activity measures, treatment

regimens, and organ damage features to be used in a Long Short-Term Memory (LSTM) model. Each visit's data was processed with prior history to create an updated patient health hidden state. The final hidden state was used to classify patients into their most likely final employment outcome. Risk scores for WD were calculated at each visit and early warning alerts were triggered if scores exceeded an optimized threshold. Prediction accuracy and lead time for early detection assessed model effectiveness.

**Results:** 129 patients eventually reported WD, these patients showed more frequent visits to the clinic over longer follow-ups, with higher doses of glucocorticoids and antimalarials, higher disease activity, irreversible damage, and more frequent flares (all  $p < 0.001$ , Table 1). The prediction model achieved 91% balanced accuracy in predicting the final employment states. More significantly, the early warning machine learning algorithm identified 89% of future disability cases, providing a median 28.6-month (IQR: 14.3–42.1) warning before first reporting WD.

**Conclusion:** Predicting workforce exit for SLE patients is critical and our early warning algorithm flagged patients at a risk of disability 2–3 years in advance. Implementing this system would enable timely interventions to help prevent work disability in SLE. By transforming reactive care into pre-emptive action, this prediction model closes a critical gap in SLE management, empowering health care teams to intervene before functional decline becomes permanent WD.

## TOUR7A

### **Do Mechanisms Matter? Comparing Early Clinical and Ultrasound Responses to Advanced Therapies in Biologic-Naïve Rheumatoid Arthritis**

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**Methods:** At the ORCHESTRA (Ottawa Rheumatology CompreHEnSive TRreatment and Assessment) Clinic, RA patients initiating a new biologic (bDMARD) or targeted synthetic DMARD (tsDMARD) underwent standardized baseline and 3-month follow-up evaluations, including clinical assessments and a comprehensive 36-joint US examination scored using the Global OMERACT-EULAR Synovitis Score (GLOESS). For this analysis, biologic-naïve patients with completed 3-month follow-up were categorized by treatment class: tumor necrosis factor inhibitors (TNFi), Janus kinase inhibitors (JAKi), and other biologics (rituximab, abatacept, or tocilizumab). Demographics, disease activity indices, and US synovitis scores were compared across groups at baseline and follow-up. Changes over time were analyzed to assess early treatment response.

**Results:** Eighty-six RA patients were included (69.8% female, mean age 55.4 years). Of these, 66 (76.7%) initiated TNFi, 11 (12.8%) JAKi, and 9 (10.5%) other biologics (rituximab: n=2; tocilizumab: n=3; abatacept: n=4). Baseline demographics and clinical features were similar, except that patients in the “other biologics” group were older and baseline deformities were more common among those initiating JAKi (Table). At baseline, disease activity scores and US

findings were comparable between treatment groups. After 3 months, all groups demonstrated improvement in both clinical and US measures, with no significant between-group differences. The only observed difference was in the duration of morning stiffness (median: other biologics 0 [0–0] hours; JAKi 0.3 [0–0.5]; TNFi 0.3 [0–0.9];  $p = 0.023$ ), primarily driven by differences between TNFi and “other biologics.” Numerically more patients on JAKi’s (63.6%) achieved CDAI remission than TNFi’s (47%) and others (44%), although not reached statistical significance.

**Conclusion:** In this real-world cohort of biologic-naïve RA patients, early (3-month) treatment responses assessed by both clinical and US measures were comparable across TNF inhibitors, JAK inhibitors, and other biologics. The findings suggest that short-term improvement in synovial inflammation is largely independent of treatment mechanism. Larger and longer-term studies are warranted to confirm these trends and identify predictors of differential therapeutic response.

## **TOUR7B**

### **Increased Biologic Uptake in Pregnant Albertan Women with Rheumatoid Arthritis (Ra), Spondyloarthritis (Spa) and Psoriatic Arthritis (Psa) Not Associated with Worse Peripartum Outcomes**

Stephanie Keeling (University of Alberta, Division of Rheumatology, Edmonton); Genevieve Jessiman-Perreault (University of Alberta, Edmonton); Anamaria Savu (University of Alberta, Edmonton); Douglas Dover (University of Alberta, Edmonton); Padmaja Kaul (University of Alberta, Edmonton)

**Methods:** Study population included all singleton pregnancies with  $\geq 22$  weeks of gestation, July 2008 and December 2024 in Alberta, Canada. Previously validated algorithms based on ICD-10 codes identified women with RA, SpA, PsA and no IMID. [1] We compared maternal characteristics, comorbidities and neonatal outcomes between no IMID and RA/PsA/SpA groups. Dispensation of RA/SpA/PsA medications during pregnancy was evaluated in two time periods (2008-2016; 2017-2024). Proportion of days covered (PDC) during pregnancy for each medication was calculated to estimate adherence. In the RA and SpA/PsA groups, logistic regression calculated the odds of delivering preterm and small-for-gestational-age (SGA) infants when exposed to biologics after adjusting for maternal factors.

**Results:** Among 788,996 pregnancies of 474,197 women, 1627 pregnancies were by women with RA, 1017 with SpA/PsA and 786,352 with no IMID. Amongst live births, RA pregnancies had higher rates of SGA babies (RA 13%, SpA/PsA 8%, no IMID 10%). RA and SpA/PsA pregnancies had more NICU admissions than without IMID (RA 13%, SpA/PsA 12%, no IMID 10%). Prescription dispensations for RA and SpA/PsA between 2008-2016 and 2017-2024 did not change for corticosteroids (RA 19% to 18%, SpA/PsA 12%), increased in RA for antimalarials (24% to 34%), and pregnancy safe DMARDs (11% to 15%). Biologic uptake and associated mean PDC (SD) increased from 12% (32 (29)) to 23% (58 (33)) in RA and 9% (31(32)) to 26% (71 (31)) in SpA/PsA. In multivariable models, no/low/medium PDC compared to high PDC biologic use was not associated with higher risk of delivering preterm or SGA infants in RA, SpA, and PsA (Table 1). Factors associated with preterm labour in RA women included “Not married” status, preeclampsia and in SpA/PsA - gestational hypertension and preeclampsia. Factors associated with SGA included maternal age > 35 years, material deprivation, multiparity, and preeclampsia for RA; and multiparity for SpA/PsA.

**Conclusion:** Biologic use in the peripartum period has increased in women with RA, SpA, and PsA without negative impacts on preterm labour and SGA. Factors such as pre-eclampsia play a large role in worse peripartum outcomes. Understanding adherence to pregnancy safe medications throughout pregnancy is needed. **Supported by a CIORA grant.**

## **TOUR7C**

### **Combination Advanced Therapy Exposures in Immune-Mediated Inflammatory Diseases Are Associated with Increased Infection Risk, Even with Short Median Duration**

Timothy Kwok (Division of Rheumatology, Department of Medicine, University of Toronto, Toronto); Jessica Widdifield (Sunnybrook Research Institute, ICES, University of Toronto, Toronto); Cristiano Soares de Moura (The Research Institute of the McGill University Health Centre, Montreal); Sasha Bernatsky (McGill University Health Centre, Department of Medicine, Division of Rheumatology, Division of Clinical Epidemiology, Montreal); Vinod Chandran (Schroeder Arthritis Institute, Krembil Research Institute, Division of Rheumatology, Department of Medicine, University of Toronto, Toronto); Gilaad G Kaplan (University of Calgary, Calgary); Proton Rahman (Division of Rheumatology, Craig L. Dobbin Genetics Research Centre, Discipline of Medicine, Memorial University of Newfoundland, St. John's); Denis Poddubnyy (Division of Rheumatology, University of Toronto, Toronto)

**Methods:** We created a cohort of initiators of any advanced IMID therapy using MarketScan administrative health data (2016-2023). Treatment episodes began at initiation and ended after a dispensation/infusion gap of  $\geq 5$  half-lives. Episodes were classified as CAT with any 30+ day overlap between advanced therapy classes. Patients were followed from start of the first advanced therapy (time zero) until disenrollment, death, or study end (December 31, 2024). We described baseline characteristics of those exposed to CAT, and estimated multivariate hazard ratios (HR) for persistence of the first CAT episode, defined as time until discontinuation of at least one of the combined advanced therapies. We adjusted for baseline age, sex, IMID, comorbidities, conventional synthetic DMARDs (csDMARDs), and glucocorticoids. We also assessed HRs for first serious infection (defined as requiring hospitalization or intravenous antibiotics) comparing person-time on combined versus single advanced therapy, adjusting for the same covariates.

**Results:** There were 270,198 individuals initiating 693,375 episodes of advanced therapy. Of these, 38,456 individuals (14.2%) initiated 52,212 episodes of CAT. Mean age at CAT initiation was 49 (standard deviation 13.5) years; 62.5% were female. Among 38,456 CAT users, the most common IMIDs were psoriasis, PsO (36.6%), inflammatory bowel disease, IBD (30.0%), rheumatoid arthritis, RA (28.0%) and psoriatic arthritis, PsA (18.9%). Baseline glucocorticoid use was common (44.0%). Among CAT episodes, 51.2% involved TNF $\alpha$  inhibitor exposure (overlapping most commonly with IL17 inhibitors, IL12/23 inhibitors, anti-adhesion molecules, JAK inhibitors or CTLA-4 agonists). Median duration of first CAT exposure was 42 days. Factors associated with lower duration of CAT exposure included RA (HR 1.27, 95% CI 1.24–1.31) and concomitant csDMARDs. Lower HRs were seen with PsO (HR 0.82, 95% CI 0.79–0.84), IBD (HR 0.85, 95% CI 0.83–0.88), and baseline Charlson Comorbidity Index  $\geq 3$  (HR 0.77, HR 0.67–0.89). During CAT exposure there were 4.8 serious infections per 100 person-years (95% CI 4.3–5.3). In multivariate analysis, CAT exposure was associated with an increased HR for serious infection (HR 1.20, 95% CI 1.08–1.33, Table) versus single advanced therapy.

**Conclusion:** In individuals starting advanced IMiD therapy, 14.2% had CAT exposures, lasting a median of 42 days. CAT exposure was associated with serious infection risk.

## **TOUR7D**

### **Improving Care for People Living with Rheumatic Disease and Extreme Poverty: an Interim Analysis of a Prospective Study on Honorarium and Outreach Supports**

Alec Yu (Division of Rheumatology, University of British Columbia, Vancouver); Daksh Choudhary (University of British Columbia - Division of Rheumatology, Vancouver); Navid Saleh (UBC Department of Medicine, Vancouver); Galen Montesano (Pender Community Health Centre, Vancouver); Mary Kestler (UBC Division of Infectious Diseases, Vancouver); Anita Palepu (UBC Department of Medicine, Vancouver); Brent Ohata (University of British Columbia, Burnaby)

**Methods:** We utilized a mixed-methods approach beginning with a retrospective chart review of all patients seen at the Clinic from January 2022 until June 2025. We concurrently conducted interviews with Clinic rheumatologists, inner-city primary care physicians, and patient representatives to understand specific barriers. Based on these findings, we designed a prospective trial for patients with inflammatory arthritis referred from local inner city community health centers. The intervention included a \$20 honorarium for each follow-up visit they attended with completed bloodwork as well as a Rheumatology-specific outreach service that provided personalized education, advice, and appointment reminders. The primary outcome was the rate of attendance to follow-up visits in the study group compared to historical controls. The study was approved by the UBC REB (H24-03984).

**Results:** Between January 2022 and June 2025, the Clinic treated 167 unique patients (Table 1). The baseline rate of attendance to follow-up visits was 52.6% overall, and 42.4% among patients with a confirmed systemic autoimmune rheumatic disease. The patient population had high rates of comorbidity: 77% had substance use disorders, while 59% had mental health disorders. Housing instability was nearly universal; 12% of patients were unhoused, while 78% lived in modular, transitional, or single-room occupancy (SRO) housing. At a planned interim analysis of the prospective study (n=9), the rate of adherence to follow-up visits was significantly improved compared to historical controls (90.5% vs 42.4%,  $p < 0.001$ ). For participants who were previously patients at the Clinic, follow-up rates improved compared to personal priors (87.5% vs 43.5%,  $p < 0.001$ ). No concerning safety signals were identified.

**Conclusion:** Standard models of care are often insufficient for marginalized populations. An intervention combining modest financial incentives and specialized outreach support may improve adherence to follow-up in this cohort. **Practice Reflection Award**

## **TOUR8A**

### **Enhancing Immunology Education for Rheumatology Trainees Using Artificial Intelligence: a Pilot Quality Improvement Initiative**

Leigha Rowbottom (Alberta Health Services, Calgary); Lori Albert (University of Toronto, Toronto); Ahmed Omar (Mount Sinai Hospital, University of Toronto, Toronto)

**Methods:** We conducted a quality improvement project involving postgraduate year (PGY) 4 and 5 rheumatology trainees. Participants completed a baseline survey assessing self-rated confidence in immunology, pathophysiology, drug mechanisms of action (MOA), and exam preparedness on a 5-point Likert scale. Participants also completed a 10-item multiple-choice

knowledge test before and after the AI session. Trainees then engaged in two 20-minute self-directed sessions using ChatGPT with two structured prompts focused on disease pathophysiology and pharmacologic mechanisms. Prompts incorporated clinical relevance, analogies, visual metaphors, Socratic questioning, as well as built-in knowledge checks. After completion of the AI session, participants repeated the confidence surveys, knowledge test and provided qualitative feedback via free-text responses. Quantitative results were descriptively analyzed. Qualitative feedback was thematically coded.

**Results:** Ten trainees completed the study (6 PGY-4, 4 PGY-5). Mean test scores improved from 80% to 98%, with the most substantial gains observed among participants with lower baseline scores. Confidence ratings improved across all domains: immunology (2.2 to 3.2), pathophysiology (2.8 to 3.78), MOA (2.5 to 3.67), and exam preparedness (2.1 to 3.67).

Qualitative analysis revealed strong perceived educational value, with participants citing interactivity, real-time feedback, and the ability to simplify complex content as strengths. Areas for improvement included enhanced visuals, interface design, and content accuracy verification.

**Conclusion:** This pilot study demonstrates the potential of AI-guided educational tools to improve both confidence and knowledge in immunology among rheumatology trainees. While limitations include small sample size and lack of long-term outcome data, findings support further exploration of AI as a scalable and customizable adjunct to traditional instruction. Integration of such tools may enrich specialty training and align medical education with evolving learner needs.

## **TOUR8B**

### **Diagnostic Accuracy of Physical Examination Maneuvers for Knee Effusion: an Ultrasound Validation Study**

Ahmed Ibrahim (University of Calgary, Calgary); Sarah Cribby (University of Calgary, Calgary); Christopher Penney (University of Calgary, Calgary); Susan Barr (University of Calgary, Calgary )

**Methods:** Consecutive consenting patients with knee pain were recruited from an academic Rheumatology clinic. Each had a knee US and clinical exam, including inspection, bulge sign (BS), balloon/cross-fluctuance (CF), and patellar tap (PT) tests by an experienced rheumatologist. The sonographer was blinded to the clinical findings. Based on published literature, a pathologic knee effusion was defined as a hypoechoic collection measuring >3.2 mm in the lateral recess with quadriceps contraction [1.].

**Results:** Patients (N=125) had a mean age of 54 + 16 years and 75% were female. Most patients had RA (45%), other inflammatory arthritis (19%), or CTD (14%). Replaced knees (N=4) were excluded. Clinical evidence of effusion was present in 92/246 knees, including 77 with a CF test, either alone (N=42) or in combination with a BS (N=19) or PT (N=16). In 14 knees with a BS alone, 9 were false positive. One knee had a PT alone which was false positive. The prevalence of pathologic knee effusion on US was 35% (87/246). The physical exam (BS, CF &/or PT + for effusion) had moderate sensitivity 71% (95% CI 61, 81), specificity 81% (95% CI 74, 87), PPV 67% (95% CI 57, 77) and NPV 84% (95% CI 77, 89), with an overall accuracy of 78%. False positive results (N=30) were significantly more frequent in patients with BMI > 25 (83%). False negative results occurred mainly with smaller effusions (<6.6 mm). The CF test had the highest agreement (80%) with US (kappa 0.54, p<0.00005) and the best overall performance (ROC area) compared to the BS and PT (p<0.05). The agreement between the physical exam and US was

lower if BMI > 25 (kappa 0.44) compared to BMI <25 (kappa 0.64).

**Conclusion:** The physical exam had moderate diagnostic accuracy for knee effusion. The CF test had the best overall performance in detecting knee effusions in patients with rheumatic diseases, a finding that has not previously been reported. The PT did not add value to the clinical exam in this study. Elevated BMI was associated with reduced accuracy and PPV of the physical exam. Accuracy of knee effusion diagnosis is improved with US, particularly in patients with elevated BMI or small effusions, and is useful for arthrocentesis planning.

## **TOUR8C**

### **Improving the Rheumatology Experience for Non-Rheumatology Rotating Residents: a Quality Improvement Project**

Samira Adus (McMaster University, Hamilton); Christina Ma (McMaster University, Hamilton); Faiza Khokhar (McMaster University, Hamilton)

**Methods:** In this two phase study, subjects were recruited via a convenience sample of non-rheumatology residents participating in the rheumatology rotation. Phase one consisted of a needs assessment, where surveys were conducted employing open-ended questions as well as quantitative questions using a 5-point Likert scale. Fishbone analysis was completed with relevant stakeholders to outline possible barriers to implementation. Phase two consisted of the creation, implementation, and assessment of a novel formal asynchronous learning module using pre and post-completion surveys to obtain qualitative and quantitative feedback to complete a PDSA cycle.

**Results:** In phase one, fifteen residents were surveyed. Over 50% of participants reported both not being exposed to formal teaching during their rotation, and not feeling that they had enough formal teaching during their rotation. Basic teaching on common rheumatologic presentations was suggested as the most beneficial topic for teaching. Fishbone analysis (Figure 1) revealed lack of educator's time, difficulty with scheduling and heterogeneous learning needs as major factors that pose challenges to the implementation of formal teaching that would need to be addressed. In phase two, preliminary data from six residents demonstrated that over 60% of participants rated the content as helpful during their clinical rotation and impacting their clinical practice. Suggested areas for further improvement included the enhancement of topics reviewed and the integration of subspecialty expert opinions.

**Conclusion:** Historically non-rheumatology residents have received limited formal teaching during their rheumatology rotations. The implementation of an asynchronous rheumatology curriculum serves as a tool to provide long-term sustainable education to rotating residents. Future work will involve continuing to build curriculum content, and the integration of subspecialist input with iterative PDSA cycles.

## **TOUR8D**

### **Effectiveness of 3D Printed Models for Knee Arthrocentesis Teaching**

Kayla Chubbs (Dalhousie University, Rothesay); Kristina Roche (Memorial University of Newfoundland, St. John's); Mary Purcell (Dalhousie University, Halifax); Eugene Krustev (University of Calgary, Calgary); Evan Walters (Memorial University of Newfoundland, St. John's); Craig Martin (St. John's); Janet Roberts (Division of Rheumatology, Dalhousie)

University, Dartmouth)

**Methods:** Medical students and residents completing a rheumatology rotation at the Nova Scotia Rehabilitation and Arthritis Centre were recruited. Participants completed surveys pre- and post-educational module, assessing confidence with knee arthrocentesis, using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Participants performed knee arthrocentesis on the 3D knee model twice, once prior to completing an educational module, and again following module completion. Participants were formatively evaluated both pre- and post-learning module, using a standardized grading metric consisting of 18 categories. Pre- and post-module scores were paired and compared using the non-parametric Wilcoxon signed rank test. Descriptive statistics were reported as median and interquartile range (IQR) for non-normal continuous variables and frequency and proportions for categorical variables.

**Results:** A total of 25 students participated, 12 medical students and 13 residents, ranging from first year medical students to residents in post graduate year 4. Formative assessment scores improved from a median score of 13 out of 18 (IQR 7.5,16) pre-module, to 17 out of 18 (IQR 16,18) post-module (p-value < 0.001, Figure 1). Within the 18 categories learners scored lowest on “perform pre-procedural time-out” (14% of participants correctly performed) and “post procedure instructions” (24% of participants correctly performed) in the pre module rubric. They improved most in these categories in the post-module rubric, 66% score correctly for “pre-procedural time out” and 76% score corrected for “post-procedural instructions”. Learners’ confidence with arthrocentesis improved from a pre-module median score of 3 out of 5 (IQR 2,4) to post-module median score of 5 (IQR 4,5), with all except 1 study participant showing improvement in post-module scores. Learners rated the use of the module as a valuable learning experience, median 5 (IQR 5, 5) and the use of the 3D arthrocentesis model as valuable to their learning, median 5 (IQR 5, 5).

**Conclusion:** The use of a 3D printed knee model for arthrocentesis teaching improved both performance and learner confidence, across various stages of training. Areas of further investigation include assessing retention of knowledge, expansion to other learning sites and utility of other 3D models (other anatomic sites and US compatible models).