1

Barriers at School for Children with Juvenile Idiopathic Arthritis

Kelsey Chomistek (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Nicole Johnson (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary , Calgary); Aiman Zia (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Rebeka Stevenson (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital, Calgary); Nadia Luca (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Paivi Miettunen (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Susanne Benseler (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Tommy Gerschman (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital, Calgary); Dwaraka Veeramreddy (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary); Heinrike Schmeling (Section of Rheumatology, Department of Paediatrics, Alberta Children's Hospital/University of Calgary, Calgary)

Objectives: Few studies in children with chronic illnesses/disability have reported challenges faced by patients at school. Therefore, the objective of this study is to identify barriers and their associated impact in juvenile idiopathic arthritis (JIA).

Methods: A cross-sectional observational study of children aged 8 to 17 diagnosed with JIA followed at the Rheumatology Clinic/Alberta Children’s Hospital was performed between July and October 2016. Demographics, diagnosis and disease course were obtained from health records. A survey was administered to the child/caregiver to assess the barriers experienced by JIA patients at school. The questionnaire collected information about school attendance/performance, impact of JIA symptoms (e.g. pain, fatigue), accommodations, communication, participation/peers, and school support. An overall rating for each domain was made. Descriptive statistics were used to analyze the data.

Results: A total of 53 children were recruited into the study. The median age of participants was 13 (range 8-17). The most common subtypes were oligoarticular persistent JIA (31.4%) and rheumatoid factor negative polyarticular JIA (27.5%) with a median disease duration of 5 years (range 0-13). The treatment included DMARDS (71.1%), NSAIDS (41.5%), biologics (41.5%), steroids (5.7%) and no medication (3.8%). Appointments, illness and JIA symptoms had a minor impact on school attendance/performance. However, physical challenges (e.g. gym, writing, sitting for long periods of time) at school were a barrier for 42.2% (sometimes 28.8%, often 9.6%, almost always 3.8%). 20% recorded using accommodations (e.g. accommodation letter, modified gym, computer access). Patients were unable to participate in activities in class/outside with their peers (total 40%: sometimes 36.4%, almost always 3.6%) and in gym (total 43.1%: sometimes 33.3%, often 9.8%). Challenges tend to be reported more often by patients with active disease. Patients told their teachers/gym teacher about their disease (86%) but most patients did not continue to update their teachers. 10.9% of participants reported that their teachers did not understand their illness compared to 18.1% of gym teachers. 85.2% of participants told their friends about their illness and 47% told their classmates. Social concerns included anxiety about being unable to participate in school related activities, being told they were faking their illness and looking like they weren’t trying. The majority reported that the school was supportive of their illness (91.8%).

Conclusion: The majority of JIA patients reported they experienced minimal impact on school attendance and performance. However, many patients experienced some impacting physical challenges. Additional barriers included teacher understanding, communication with classmates and social anxiety.

2

Development of a National Rheumatoid Arthritis Core Clinical Dataset (RACCD) in Canada to Support High Quality Care for RA Patients

Claire Barber (University of Calgary, Calgary); Vandana Ahluwalia (William Osler Health System, Ontario Rheumatology Association, Brampton); Michel Zummer (Université de Montréal, Département de médecine, Montreal); Dianne Mosher (University of Calgary, Calgary); Deborah Marshall (University of Calgary, Calgary); Denis Choquette (Institut de rhumatologie de montréal, Montréal); Diane Lacaille (University of British Columbia (Division of Rheumatology)/ Arthritis Research Canada, Richmond); Claire Bombardier (Ontario Best Practices Research Institute, University of Toronto, Toronto General Research Institute, Toronto); Emily Dao (RAND Corporation, Sanat Monica); Dmitry Khodyakov (The RAND Corporation, Santa Monica); Cheryl Barnabe (University of Calgary, Calgary); RACCD Working Group Rheumatoid Arthritis Core Clinical Dataset Working Group (Calgary)

Objectives: Initiatives to support high quality rheumatoid arthritis (RA) care in Canada are hampered by substantial variation in the data collected during clinical practice. The objective of this project was to develop a Canadian RA Core Clinical Dataset (RACCD) to inform the harmonization of a core minimum set of data for collection in rheumatology.

Methods: There were 4 phases in the development of the RACCD. Phase 1: arthritis stakeholders (including 19 rheumatologists, researchers, and a patient representative) suggested a list of core elements relevant to RA practice. Phase 2: The set was refined during an in-person meeting based on importance to the provision of high quality clinical care. Elements of uncertain importance were assigned to literature reviewers to determine concordance with guidelines and quality measures. Phase 3: the reviews for each individual element were discussed during 2 teleconferences attended by 22 stakeholders. Phase 4: an online-modified Delphi process using RAND-appropriateness methodology was held over 3 rounds to obtain input from a broader representation of rheumatologists, allied health professionals and patients from across Canada (n=51). Participants were asked to rate both the importance and feasibility of including each element in the core set on a Likert scale of 1-9, then participate in an online moderated discussion to review the panelists' results and in the final round re-vote. Elements were included in the final set if both importance and feasibility ratings had a median 7 without disagreement.

Results: Ten subgroups of related elements comprising 55 individual elements were eventually included in Phase 4. Subgroups included: measures of RA disease activity, dates to calculate waiting times, disease duration and date of first DMARD, comorbidities, smoking status, patient reported pain and fatigue, physical function, laboratory and radiographic investigations, medications, clinical characteristics and vaccines. Of these 9 subgroups met inclusion criteria for the final set with the exception of the vaccines subgroup. Additionally, 3 items from the smoking subgroup were eliminated with a recommendation to capture smoking status as never/ever/current and 2 questions relating to coping and impact of fatigue were eliminated, while level of fatigue was retained. All other elements met thresholds for inclusion in the final set.

Conclusion: The selected elements represent a national recommendation on which data elements should be routinely captured in clinical practice to support high quality care for RA patients.

When planning upgrades to clinic processes or electronic records systems, this set should be included at a minimum to support high quality care.

3

Increased Risk of Postpartum Depression in SLE Pregnancies

Evelyne Vinet (McGill University Health Centre, Montreal); Susan Scott (McGill University Health Centre, Montreal); Debbie Feldman (Université de Montréal, Montreal); Christian Pineau (Montreal General Hospital, Division of Rheumatology, Montreal); Sasha Bernatsky (McGill University Health Centre, McGill University, Montreal)

Objectives: Within a large population-based cohort, we aimed to evaluate the risk of postpartum depression (PPD) in women with SLE compared to unaffected women and explored potential mediators of PPD in SLE pregnancies.

Methods: The "Offspring of SLE mothers Registry (OSLER)" includes all women who had ≥1 hospitalization for delivery after SLE diagnosis, identified through Quebec's universal healthcare databases (1989-2009), and a randomly selected control group of women, matched at least 4:1 for age and year of delivery. We ascertained PPD based on ≥1 hospitalization or physician visit with relevant diagnostic codes, ≤12 months after delivery. We performed multivariate analyses to adjust for maternal education, race/ethnicity, and pre-existing mood disorders in the 2 years prior to delivery. In secondary analyses, we further adjusted for pregnancy complications, including preterm birth, gestational diabetes, and stillbirth, to explore potential mediators of postpartum de-pression in SLE pregnancies.

Results: 509 women with SLE had 729 births, while 5824 matched controls had 8541 births. We identified PPD in 11.0% (95% CI 8.8, 13.5) of SLE pregnancies versus 8.3% (95% CI 7.7, 8.9) of unexposed pregnancies. More SLE pregnancies were preceded by a mood disorder in the 2 years prior to delivery as opposed to unexposed pregnancies [15.4% (95% CI 12.9, 18.2) vs 11.0% (95% CI 10.2, 11.5)]. In primary multivariate analysis, accounting notably for pre-existing mood disorders, SLE pregnancies were at increased risk of PPD versus unexposed pregnancies [OR 1.32 (95% CI 1.01, 1.73)]. The effect estimate for SLE was attenuated when we further adjusted for pregnancy complications [OR 1.20 (95% CI 0.92, 1.58)]. Pre-term birth [OR 1.55 (95% CI 1.20, 2.00)] and stillbirth [OR 6.49 (95% CI 3.32, 12.67)] were independent predictors of PPD. Pre-existing mood disorders in the 2 years prior to delivery also was an independent predictor of PPD in both primary and secondary multivariate analyses [OR for primary analysis 4.44 (95% CI 3.73, 5.29)].

Conclusion: Compared to women from the general population, women with SLE have an increased risk of PPD. Mediators of PPD in SLE potentially include pregnancy complications, such as preterm birth and stillbirth. Further research is needed to evaluate the role of disease activity and/or flare during pregnancy, as well as medication exposures on the risk of PPD in SLE.

4

It is About us: Patient Engagement in Health Research from Arthritis Patients' Perspective

Jenny Leese (Arthritis Research Canada, Vancouver); Graham Macdonald (Arthritis Research Canada, Richmond); Bao Tran (Arthritis Research Canada, Richmond); Lianne Gulka (Arthritis Research Canada, Richmond); Alison Hoens (University of British Columbia, Vancouver); Sheila Kerr (Arthritis Research Canada, Richmond); Wendy Lum (Arthritis Research Canada, Richmond); Linda Li (University of British Columbia (Department of Physical Therapy)/Arthritis Research Canada, Richmond)

Objectives: Patient engagement in health research is understood to occur when patients are

meaningfully at any stage of the research process. Support for patient engagement as a means to improve the quality of research continues to increase. There is little in-depth understanding, however, of meaningful patient engagement from the patient perspective. Our objectives are to: 1) explore arthritis patients' views and experiences of patient engagement in research, 2) understand the barriers and facilitators to patient engagement in health research from arthritis patients' perspectives.
Methods: The project is jointly designed by researchers and patient partners. Eligible individuals were current or past members of an arthritis patient advisory board. Participants were invited to take part in a one-hour in-depth interview (in-person or phone). Each recorded interview was organized around 3 areas: 1) experiences/benefits/downsides of being a patient engaging in research; 2) interactions with researchers; 3) perspectives on the advisory board's development. Aspects of grounded theory guided our iterative thematic analysis. Interview transcripts were read and coded independently by 3 researchers. Initial themes were identified after repeated readings of transcripts and discussion. Further discussion with patient partners informed development of themes.
Results: In 2015-2016, 22 participants (18 current members of the arthritis patient advisory board; 4 past members) were recruited. 21 (95%) were female (aged 26-68 years), and time spent as a member ranged from 1 month to 10 years. 16 (73%) had inflammatory arthritis and 9 (41%) had osteoarthritis. Barriers and facilitators to cultivating patient engagement were described across 4 themes: 1) engagement as an opportunity to empower patients through making their voices heard; 2) adding volunteer work to an already busy life; 3) building social relations; 4) demonstrating respect within physical and emotional impacts of juggling multiple priorities. Facilitators included actions taken by patients and researchers to indicate they value each other's contributions and patients being prepared with new and existing knowledge and skills. Patient leadership and perceived benefits (e.g. finding purpose in the added work) play key facilitating roles in fostering engagement.
Conclusion: Patients with chronic disease provide in-depth insight into the impact of patient engagement in research beyond the research itself. If meaningful patient engagement is to be achieved, evidence-based resources are needed to guide patients, researchers and research organizations in cultivating practices of patient engagement based on patients' perspectives. Our findings are a critical step in the development of these resources.

5

Recommendations for the Diagnosis and Monitoring of Systemic Lupus Erythematosus in Canada

Stephanie Keeling (University of Alberta, Division of Rheumatology, Edmonton); Tamara Rader (University of Ottawa, Ottawa); Jordi Pardo (University of Ottawa, Ottawa); Nancy Santesso (McMaster University, Hamilton); Canadian SLE Working Group (Edmonton)

Objectives: Practice patterns for diagnosing, monitoring and treating systemic lupus erythematosus (SLE) vary considerably, as evidenced by a recent survey of Canadian Rheumatology Association (CRA) members. Therefore, the Canadian Systemic Lupus Erythematosus (SLE) Working Group was created to develop recommendations for caregivers of SLE with a focus on diagnosis and monitoring. These recommendations were developed using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach.
Methods: A meeting of rheumatologists comprising the newly formed Canadian SLE Working Group was conducted in February 2013 to review the practice pattern survey and discuss topics

for guideline development. Questions were prioritized post-meeting by online voting (Survey Monkey) to serve as the basis of future recommendations. Eight sub-groups were developed from members of the working group and each conducted a systematic literature review. Consultants from the Cochrane Musculoskeletal group and the GRADE Working Group provided guidance through a series of webinars (join.me) and conference calls to perform systematic literature reviews and complete GRADE Evidence To Decision tables (ETDs). Two meetings conducted in September 2015 (Toronto) and February 2016 (Lake Louise) were held where the EtDs with candidate recommendations were presented, discussed and voting conducted to produce the final set of recommendations.
Results: With few randomised controlled trials providing evidence for diagnosis and monitoring, the majority of studies identified were non-randomised observational studies that were assessed and used as the evidence base for recommendations. The recommendations for diagnosing and monitoring SLE in Canada encompass eight aspects of lupus care: (1) disease activity and damage (2 recommendations), (2) cardiovascular risk (11 recommendations), (3) osteoporosis risk (4 recommendations), (4) osteonecrosis risk (4 recommendations for symptomatic, and 1 recommendation for asymptomatic), (5) pregnancy (9 recommendations), (6) infection risk screening (including influenza, varicella zoster, Hepatitis B and C) (4 recommendations), (7) cervical cancer screening (2 recommendations) and (8) importance of the lupus caregiver role (2 recommendations). The recommendations were graded as strong or weak and best practice statements developed with certain recommendations.
Conclusion: These are the first recommendations developed for the diagnosis and monitoring of SLE in Canada and internationally that used the GRADE approach. Next steps include dissemination of these recommendations to Canadian rheumatologists. Future work will involve GRADE-based pharmacotherapy recommendations. Canadian SLE Working Group Members: Alabdurubalnabi, Avina-Zubieta, Baril Dionne, Barr, Bergeron, Bernatsky, Bourre Tessier, Clarke, Dutz, Ensworth, Fifi-Mah, Fortin, Gladman, Haaland, Hanly, Hiraki, Hussein, Keeling, Legault, Levy, Lim, Matsos, Mcdonald, Medina, Peschken, Pope, Reynolds, Silverman, Suitner, Touma, Tselios, Urowitz, Vinet

6

Understanding Familial Ankylosing Spondylitis: Clinical Characteristics and Response to Biologics

Bruce Sheng (University of Toronto, Toronto); Ismail Sari (Toronto Western Hospital, Toronto, Toronto); Mansour Alazmi (Toronto Western Hospital, University of Toronto, Spondylitis Clinic, Toronto); Nigil Haroon (University Health Network, Toronto)

Objectives: Familial ankylosing spondylitis (AS) patients (from multiplex families) have been reported to have different disease characteristics compared to sporadic AS. However, the data is conflicting. We studied the differences in clinical features and treatment response between familial and sporadic AS in a large Canadian cohort.
Methods: Data on AS patients that was prospectively and systematically collected over 15 years was analyzed. Individuals who satisfied the modified New York criteria were included in the study. Familial AS was defined as patients with ≥1 first- or second-degree relatives with AS. AS patients with no family history of AS were categorized as sporadic AS. Demographic information and clinical characteristics were collected, including age of onset, HLA-B27 status, smoking history, disease activity (BASDAI, ESR, CRP), extra-articular manifestations (EAMs; uveitis, psoriasis, inflammatory bowel disease [IBD]), family history of EAMs, and radiographic disease severity (mSASSS). Response to treatment with TNF inhibitors (TNFi) was assessed. T-

tests and chi-square tests were performed. Multivariable logistic regression analyses were used to determine factors associated with primary TNFi response (sustained clinical effect >1 year) in biologic-naïve patients.
Results: Out of 888 AS patients (74.0% male, 76.1% HLA-B27 positive, mean [SD] age 45.6 [13.7], disease duration 15.0 [11.5]), 177 (19.9%) had familial AS. Compared to sporadic AS, familial AS patients experienced earlier age of onset (22.5 vs 24.3; p=0.016), longer disease duration (17.4 vs 14.3; p=0.003), higher HLA-B27 positivity (89.8% vs 64.7%; p<0.0001), higher rates of uveitis (44.6% vs 28.1%; p<0.0001) as well as family history of EAMs—psoriatic arthritis (5.6% vs 2.3%; p=0.045), IBD (21.5% vs 7.2%, p<0.0001), and uveitis (13.6% vs 2.0%, p<0.0001). However, familial and sporadic AS did not differ in disease severity, radiographic severity, or likelihood of response to biologic treatment. No other between-group differences were observed. In a multivariable model controlling for potential confounders, male sex (OR 2.992 [95% CI 1.050-8.526]), longer disease duration (OR 1.064 [95% CI 1.022-1.109]), and positive smoking history (OR 3.265 [95% CI 1.344-7.933]) were associated with TNFi failure. In this model, familial AS status did not predict TNFi response (OR 0.672 [95% CI 0.265-1.708]).
Conclusion: Familial AS patients had earlier disease onset and were more likely to be HLA-B27 positive compared to those with sporadic AS. Familial AS patients had higher incidence of uveitis and family history of EAMs. Notably, familial and sporadic AS did not differ in disease severity or response to TNFi, suggesting that they may be approached similarly in clinical care.

7

Utility of Biomarkers for the Diagnosis and Management of Takayasu's Arteritis: A Systematic Review and Meta-analysis

Jacqueline Malette (University of Western Ontario, London); Christian Pagnoux (University of Toronto, Toronto); Lillian Barra (The University of Western Ontario, London); CanVasc (Toronto)

Objectives: Takayasu's arteritis (TAK) is a rare large vessel vasculitis predominantly affecting young females. Symptoms of disease are often non-specific and laboratory and/or imaging studies can be normal initially making early diagnosis challenging. In established disease, TAK may progress asymptomatically until irreversible damage is accrued. The objective of this study was to perform a literature review to examine the utility of various laboratory biomarkers in diagnosing TAK and assessing disease activity.
Methods: A comprehensive literature search was performed using MEDLINE, PubMed, EMBASE, Cochrane Library, Web of Science, and BIOSIS Previews. We included all studies of adult and/or pediatric TAK patients that report on the utility of any laboratory biomarker for the diagnosis of TAK or assessment of disease activity. Case reports, reviews and case series with less than 10 subjects were excluded. Abstracts were reviewed independently by two authors (JM and LB). Methodologic quality was assessed using the Newcastle/Ottawa scale. Random effects meta-analysis (DerSimonian and Laird methods) was performed to assess the correlation of a biomarker with disease activity.
Results: The literature review yielded 2131 citations and 189 articles met inclusion criteria. All studies were observational. Study sample sizes ranged from 10-216. Studies included predominantly female subjects (59-100%) with an average age ranging from 30-36 years and disease duration from 0.2-15 years. 118 potential biomarkers were reported in the literature; their utility in diagnosis was unclear as studies were small and lacked an appropriate comparator group. For disease activity, the most commonly evaluated biomarker was erythrocyte sedimentation rate (ESR) (N=23), which correlated strongly with active disease as determined by

physician opinion and/or imaging studies: pooled r= 0.597 (95% CI: 0.492, 0.686); I2=89%. Studies assessing the utility of C-reactive protein (CRP) suggested that elevations are associated with active disease (outcome measures for these studies were highly variable and meta-analysis was not be performed). IL-2, IL-6, IL-12, Pentraxin-3, and matrix metalloproteinases were reported to be useful for assessing disease activity in TAK; however, the studies were small, of low methodologic quality and results were not validated for clinical use.
Conclusion: The role of laboratory biomarkers for the diagnosis of TAK is inconclusive from the currently available literature. For assessing disease activity, ESR correlated strongly with disease activity. However, studies are heterogeneous and lack a gold standard comparator. Larger, better designed studies are needed to determine the utility of biomarkers in managing TAK. Supported by a CIORA grant.

8

Cancer in Systemic Lupus Erythematosus: Results from the Systemic Lupus International Collaborating Clinics Inception Cohort

Sasha Bernatsky (McGill University Health Centre, McGill University, Montreal); Murray Urowitz (University of Toronto, Toronto); John Hanly (Dalhousie University and Nova Scotia Health Authority, Halifax); Ann Clarke (University of Calgary, Calgary); Caroline Gordon (University of Birmingham, College of Medical and Dental Sciences,, Edgbaston); Juanita Romera-Diaz (Instituto Nacional de Ciencias Médicas y Nutrición, Mexico City); Graciela Alarcón (The University of Alabama, Birmingham); Sang-Cheol Bae (Department of Rheumatology, Hanyang University Hospital for Rheumatic Diseases, Seoul); Michelle Petri (Johns Hopkins University School of Medicine, Baltimore); Joan Merrill (Oklahoma Medical Research Foundation, Oklahoma City); Daniel Wallace (Cedaus-Sinai Medical Centre, West Hollywood); Paul Fortin (Université Laval, CHU de Québec, Quebec); Dafna Gladman (University of Toronto, Toronto); David Isenberg (University College, Faculty of Medicine, Department of Rheumatology, London); Anisur Rahman (University College, Faculty of Medicine, Department of Rheumatology, London); Susan Manzi (West Penn Allegheny Health System, Allegheny General Hospital,, Pittsburgh); Ola Nived (Lund University Hospital, Lund); Gunnar Sturfelt (Lund University Hospital, Lund); Christine Peschken (University of Manitoba, Winnipeg); Jorge Sanchez-Guerrero (Toronto Western Hospital, Toronto); Guillermo Ruiz-Irastorza, (Biocruces Health Research Institute, Hospital Universitario Cruces, Bizkaia); SLICC Systemic Lupus International Collaborating Clinics Investigators (SLICC, Pittsburgh); Jeremy Labrecque (McGill University, Montreal); Jennifer Lee (RI-MUHC, Montreal); Rosalind Ramsey-Goldman (Northwestern University Feinberg School of Medicine, Chicago)

Objectives: Published studies of cancer risk have not focussed solely on clinically confirmed, incident SLE patients. Prior studies thus may not reflect the cancer experience of all patients. To fill this knowledge gap, our purpose was to describe cancer incidence in a large inception SLE cohort.

Methods: Patients meeting ACR criteria for new-onset SLE were enrolled across 32 centres. Of 1848 patients enrolled across 1999-2011, at least one follow-up were available for 1676. At annual assessments, new reported cancer diagnoses were confirmed by reviewing medical files including pathology reports. Patients were followed until death, last visit, or end of study interval for this analysis(August 2015). Comparison general population cancer rates, weighted according to the age and sex structure of the SLE cohort, were obtained from participating countries. Non-invasive and non-melanoma skin cancers, which are not found in cancer registry data, were excluded.

Results: Mean age at SLE diagnosis was 34.6(SD 13.3). Mean follow-up was 6.85(SD 3.6), for a total of 11,481 patient-years. We observed 35 invasive cancers in 35 patients. At cancer diagnosis, mean age was 51.5(SD 15.6) and average SLE duration was 5.0(SD 3.3) years. The most common cancer type was breast(n=7), followed by, lung(n=6), prostate(n=5), 3 head and neck (tonsillar, tongue, and oral), cervical(n=2), thyroid(n=2), melanoma(n=2), leukemia(n=2), and one each of non-Hodgkin lymphoma, multiple myeloma, renal carcinoma, gastric carcinoid, thymoma, and dermatofibrosarcoma. Eighteen of 35 patients (51.4%) who developed cancers were current (n=3) or ex-smokers; five of the six lung cancers were current or ex-smokers. The over-all cancer rate in the SLE population was 3.1 per 1000 patient-years(95% CI, 2.1 to 4.2) versus the general population rate of 2.7 per 1,000 person-years. Hematological cancer incidence in SLE was 4.5 per 10,000 patient-years (95% CI, 1.2 to 11.4), a non-significant increase above the population rate of 2.1 per 10,000 person-years. Only lung cancer was clearly increased; the SLE lung cancer incidence was 5.2 per 10,000 person years (95% CI 1.9-11.4), versus 1.7 per 10,000 person-years in the general population.
Conclusion: The SLE cancer incidence rate was 3.1 per 1,000. Comparisons of cancer in SLE versus the general population must be interpreted with caution, given differences in outcome ascertainment in the two populations. Lung cancer was one of the most common cancers. Most lung cancer cases were smokers, supporting the belief that lung cancer risk in SLE (as in the general population) may be largely driven by smoking.

9

Predictors of Relapse in 225 Granulomatosis with Polyangiitis Patients

Bailey Russell (University of Toronto, Toronto); Rach Chahal (Mount Sinai Hospital, Toronto); Simon Carette (University of Toronto, Toronto); Christian Pagnoux (University of Toronto, Toronto)

Objectives: Several non-Canadian studies in patients with granulomatosis with Polyangiitis (GPA) reported that the main predictors of relapse would include ENT manifestations, lung disease, and/or PR3-ANCA positivity. Therapeutic studies also suggested that the use of cyclophosphamide (CYC) for induction reduced relapse rate, compared to other agents such as methotrexate. Here, we sought to determine predictors of relapse in a new, independent cohort of 225 adult patients followed at the vasculitis clinic in Toronto, Canada.
Methods: Data from patients with GPA followed at the vasculitis clinic in Toronto was extracted from the CanVasc database and included demographics, main clinical manifestations and biological results (serum creatinine and ANCA reactivity by ELISA) at diagnosis, treatments, relapses, and deaths. Relapse was defined by a re-occurrence or new onset of disease attributable to active vasculitis after a period of remission, which required an increased prednisone dose, and/or a dose change or addition of another immunosuppressant medication. To identify independent predictors of relapse, parameters with $P \leq 0.20$ in the univariate analysis were retained in the final multivariate fit proportional hazards model.
Results: With a mean follow-up of 100.0 (± 135.5) months from diagnosis, relapses occurred in 64.4% of patients, with an average time to first relapse of 87.3 ± 7.3 months. Death occurred in 2.7% of patients. CYC was used for induction in 64.2% of patients and rituximab in only 3.9%. In univariate analysis, PR3-ANCA positivity had an HR of 0.96 (p=0.85), while the presence of ENT manifestations (HR 1.46, p=0.06), pulmonary nodules (HR 1.42, p=0.04), MPO-ANCA positivity (HR 1.53, p=0.11), and cyclophosphamide (CYC) use for induction of remission (HR 0.67, p=0.03) were identified as having a $P \leq 0.20$. In multivariate analysis, CYC use was the only parameter associated with a significantly lower relapse rate (HR 0.65; 95% CI 0.46-0.94,

p=0.02). HR of relapse was 1.46 (95% CI 0.83-2.57, p=0.19) for MPO-ANCA+, 1.36 (95% CI 0.88-2.11, p=0.17) for ENT manifestations and 1.09 (95% CI 0.70-1.71, p=0.69) for lung nodules. With CYC excluded from the model, none of these latter parameters were significant predictors of relapse. The 5-year relapse-free survival rate was 57.3% for CYC recipients and 45.2% for those who did not receive CYC at diagnosis.
Conclusion: These findings support that induction treatment with CYC is associated with a lower relapse rate and may overcome other previously reported clinical predictors of relapse.

10

Severity of Skin Involvement and the Risk of Subsequent Organ Damage and Mortality in a Large Systemic Sclerosis Cohort

Tatiana Nevskaya (Rheumatology Research, St. Joseph's Health Care, London); Murray Baron (Jewish General Hospital, Montreal); Janet Pope (Western University, London)

Objectives: To estimate whether severity and progression of skin thickening over 12-months is related to disease activity in early systemic sclerosis (SSc) and predicts subsequent development of severe internal organ involvement and mortality, adjusted for potential confounding factors.
Methods: SSc patients from the Canadian Scleroderma Research Group (CSRG) database who had disease duration from the onset of skin thickening ≤3 years (N=421); and had no evidence of end-stage internal organ damage at initial visit and 1 year follow-up data were included (N=254). Severity of skin involvement was assessed by modified Rodnan skin thickness score (mRSS) and skin thickness progression rate (STPR). Internal organ involvement was based on Medsger severity scores. Disease activity was determined by the EScSG activity score. Sub-analysis was performed in early diffuse SSc inception cohort. Cox proportional hazards regression and multivariable logistic regression analyses were used to assess the association between skin thickening and subsequent organ damage or mortality.
Results: Baseline mRSS and STPR were significantly associated with disease activity and severity, and function (HAQ-DI). Progression of visceral disease, including deterioration in cardiovascular, renal and pulmonary function occurred earlier in patients with a higher initial mRSS and rapid skin thickening progression. Skin score improvement over FU period was significantly linked to reduction in disease activity, but had no association with the stabilization or/and improvement of visceral disease. EScSG activity index was the best predictor of severity of visceral disease (P<0.001). Persistent high disease activity or an increase in disease activity over 1 year FU was the only significant predictor of disease progression using logistic regression. Forty-four patients died within the first year. Significant independent predictors of mortality included total disease severity score (p<0.0001), severe heart involvement (p<0.01), disease activity (p<0.02) and age (p<0.01).
Conclusion: High mRSS and rapid progression of skin thickening was linked to disease activity and earlier development of severe internal organ damage. Skin improvement over 1 year was not associated with lower risk of visceral disease progression.

11

Sex, Smoking and Excess Weight: Effects on DAS28 Trajectories in the First 2 Years in RA

Susan Bartlett (McGill University, Montreal); Orit Schieir (University of Toronto, Toronto); Kathleen Andersen (McGIll University, Beaconsfield); Gilles Boire (Université de Sherbrooke, Sherbrooke); Boulos Haraoui (Institut de Rhumatologie de Montreal, Montréal); Carol Hitchon (University of Manitoba, Winnipeg); Edward Keystone (Mount Sinai Hospital, University of Toronto, Toronto); Janet Pope (Western University, London); Carter Thorne (Southlake Regional Health Centre, Newmarket); Diane Tin (Southlake Regional Health Centre,

Newmarket); Vivian Bykerk (Hospital for Special Surgery, New York); CATCH Canadian Early Arthritis Cohort Investigators (Toronto)

Objectives: Early, aggressive treatment to achieve remission is associated with improved long-term outcomes. We have previously shown that individuals who smoke and have excess weight are less likely to achieve sustained remission in the first 3 years. Here we explored how smoking, excess weight, and sex impacted rate of DAS28 improvement in the first 2 years of early RA (ERA).

Methods: Data were from CATCH, a multicenter prospective cohort study of >3000 ERA patients in usual care settings. Inclusion criteria were: meeting 1987/2010 ACR criteria; <12 months symptom duration and DAS28≥2.6 at entry; and BMI and DAS28 at baseline and at least 1 follow-up visit. We examined how sex, excess weight (overweight: BMI 25-29.9; obese: BMI 30+) and smoking (current/former/never) impacted DAS28 at baseline and over time using linear growth models. Covariates included baseline age, race, education, comorbidities, symptom duration, and treatment.

Results: The sample included 1109 patients with a mean [SD] age of 53 [15], symptom duration of 5 [3] months, DAS28 5.3 [1.3] and HAQ-DI 1.1 (0.7); most were female (72%) and white (85%). Among males 44% (n=138) were overweight, 35% (n=109) were obese and 22% (n=70) smoked; among females, 31% (n=248) were overweight, 32% (n=257) were obese and 15% (n=121) smoked. At enrollment, most (88%) were on cDMARDS and 73% were on MTX. Results of the growth curve model showed that sex, excess weight, and smoking were not significantly associated with baseline DAS28 (p>0.05). However, each attenuated the rate of DAS28 change over time. The average rate of improvement in DAS28 at each time point was lower in women vs. men (b: -.02; 95% CI: -.04 to -.01); those who were overweight (b: -.01; 95% CI: -.03 to .00) and obese (b:-.02; 95% CI: -.04 to -.01) vs. healthy weight; and current (b: -.03; 95% CI: -.05 to -.02) and former (b: -.02; 95% CI: -.04 to -.01) smokers compared to never smokers.

Conclusion: Results from a large multi-center cohort study showed that smoking and excess weight are common in ERA. Being female, overweight or obese, and both current and former smoking significantly attenuated the rate of improvement in RA disease activity over the first 2 years. These results contribute to growing evidence of how lifestyle impacts treatment outcomes and the potential value of stopping smoking and achieving a healthy weight early in the course of RA to optimise disease management and improve outcomes.

12

Smoke and (In)flame: Risk of COPD in Systemic Autoimmune Rheumatic Diseases

Kun Huang (University of British Columbia, Vancouver); Mohsen Sadatsafavi (University of British Columbia, Vancouver); Eric Sayre (Arthritis Research Canada, Richmond); John Esdaile (University of British Columbia (Division of Rheumatology)/Arthritis Research Canada, Richmond); Antonio Avina-Zubieta (Arthritis Research Centre of Canada, Richmond)

Objectives: 1) To assess the risk of newly recorded COPD cases among incident systemic autoimmune rheumatic diseases (SARDs) including systemic lupus erythematosus, systemic sclerosis, Sjögren's disease, poly/dermatomyositis, and adult systemic vasculitides compared to controls; 2) To determine the time trends of the risk of COPD in relation to the onset of incident SARDs.

Methods: We conducted a retrospective matched cohort study (1996-2010) among patients meeting >=1 of the following criteria: a) One diagnostic code for SARDs on >=2 visits within a two-year period by a non-rheumatologist physician; b) one ICD-9 code by a rheumatologist or

from hospitalization; c) no prior SARDs diagnosis between 1990 and 1995. Ten controls randomly selected from the general population were matched by birth year, sex, and calendar year of exposure for each case. We also performed multivariable and sensitivity analysis to adjust for unmeasured confounders using Cox's models. Outcome: first ever-diagnostic code for COPD during the follow-up from hospitals or death certificates.
Results: Diagnosis of SARDs was significantly associated with a higher incidence of overall COPD incidence. Among 14,573 individuals with connective tissue diseases (CTD) as a group, the IRR was 1.83 (95% CI 1.60, 2.09). Among individual CTD, systemic sclerosis and polymyositis had the highest IRRs, 3.09 (95% CI 2.15,4.35) and 3.55(1.92, 6.20) respectively. Among 1,603 individuals with vasculitides as a group, the IRRs were 3.21(95% CI 2.55, 4.01). GPA had the highest IRR at 4.94 (95% CI 3.24,7.36). The IRRs for COPD were substantially larger in the first year after the diagnosis of the SARDs compared to the following years. In a multivariable analysis, the HRs for COPD among the SARDs cases were 1.99 (95% CI 1.52-2.59) for SLE, 3.29 (95% CI 2.22-4.87) for systemic sclerosis, 1.91 (95% CI 1.14-3.2) for Sjogren's, 3.08 (95% CI 1.41-6.73) for polymyositis, 2.88 (95% CI 1.18-7.04) for polyarteritis nodosa, 5.59 (95%CI 3.31-9.43) for GPA, and 1.91 (95% CI 1.24-3.39) for GCA as compared to the comparison cohort. Many of these HRs persisted in our age and sex stratified subgroup analyses as well as sensitivity analysis.
Conclusion: This large general population-based study shows substantially elevated risks for COPD among patients with SARDs, especially during the first year after diagnosis of SARDs. This association requires confirmation and investigation into potential preventative strategies to reduce COPD risk.

13

TNF*α* Inhibitors are Associated with Reduced Progression of Carotid Atherosclerotic Plaques by Ultrasound and an Improvement in Aortic Arch Vascular Inflammation by 18-FDG PET/CT in Psoriasis and Psoriatic Arthritis Patients – A Prospective Study

Lihi Eder (Women's College Hospital, Toronto); Aditya Joshi (National Heart, Lung, and Blood Institute, Bethesda); Vinod Chandran (University of Toronto and University Health Network, Toronto); Amit Dey (National Heart, Lung, and Blood Institute, Bethesda); Richard Cook (University of Waterloo, Waterloo); Abhishek Chaturvedi (National Heart, Lung, and Blood Institute, Bethesda); Dafna Gladman (University of Toronto, Toronto); Nehal Mehta (National Heart, Lung, and Blood Institute, Bethesda)

Objectives: The impact of TNF inhibitors (TNFi) on subclinical indices of cardiovascular (CV) disease has not been assessed prospectively. We performed a two-stage study to understand the effect of TNFi on subclinical CV disease in psoriatic patients.
Methods: We first assessed carotid plaque area by ultrasound in psoriasis and psoriatic arthritis (PsA) patients (n=319). Carotid arteries were assessed by ultrasound to measure total plaque area (TPA) at baseline and after 2-3 years. The average annual progression rate (APR) of atherosclerosis was the outcome of interest. Due to a statistically significant interaction between sex and TNFi therapy, we assessed APR for men and women separately. The findings from stage 1 led us to create an inception cohort to assess TNFi effect on vascular inflammation in PsA. In stage 2 we studied vascular inflammation using FDG PET/CT in PsA patients on TNFi (n=21) and age and sex matched PsA patients not on any biologics (n=13). This sample underwent clinical phenotyping and FDG PET/CT scans at baseline and 1 year to assess vascular inflammation, measured as target-to-background ratio (TBR). In both studies, statistical analyses included multivariable regression adjusting for CV risk factors and statins, and performing sex-

TNFi therapy interaction.
Results: In the first stage, of the 319 patients the mean age was 54.5 years (56.3% men). At follow-up, TPA progressed in 46% patients. There was no difference in TPA progression between PsA and psoriasis alone (p=0.73). Men had a significantly higher APR compared to women (2.4 vs. 0.6 mm2, p<0.001). TNFi was associated with a reduced APR (β=-2.25, 95% CI -3.45, -1.05, p<0.001) in men, after controlling for CV risk, statins and DMARDs. However, there was no association between TNFi and APR in women (p=0.71). In the second stage, the mean age was 52 years (52% men) with moderate to severe vascular inflammation by FDG PET/CT (average TBR 1.89). At 1 year, patients on TNFi had a reduction in TBR (mean±SEM 1.9±0.06 vs. 1.76±0.05, p=0.03), despite no major change in CV risk factors. However, those not on TNFi had no significant change in their TBR (1.86±0.06 vs. 1.89±0.07, p=0.32) and no difference between men and women was observed by TNFi treatment.
Conclusion: TNFi treatment was associated with reduced progression of carotid plaque and an improvement in vascular inflammation in a large two-stage study of psoriasis and PsA. This association was stronger in men than women suggesting a role for gender in CV disease progression.

14

The Impact of Hip and Knee Osteoarthritis on the Subsequent Risk of Incident Diabetes: A Population-Based Cohort Study

Tetyana Kendzerska (University of Toronto, Toronto); Lauren King (University of Toronto, Toronto); Ruth Croxford (Institute for Clinical Evaluative Sciences, Toronto); Ian Stanaitis (Women's College Research Institute, Women's College Hospital, Toronto); Gillian Hawker (University of Toronto, Toronto)

Objectives: Osteoarthritis (OA) and diabetes commonly co-occur. Potential explanations include common risk factors (aging, obesity) and the effects of OA-related functional limitations on diabetes risk factors (e.g., sedentary behavior exacerbates metabolic syndrome). However, whether or not there is a causal relationship between OA and diabetes is unclear. In a large population-based cohort free of diabetes at baseline, we examined the relationship between self-reported hip and knee OA and incident diabetes.
Methods: A population cohort aged ≥55 years was recruited from 1996-98 and followed through provincial health administrative data to 2014. Subjects with baseline diabetes, rheumatic diseases, and medical conditions associated with functional disability were excluded. Age, sex, height, weight, joint complaints and functional limitations were collected. Hip and knee OA were defined as swelling, pain, or stiffness in any joint lasting 6 weeks in the past 3 months and indication on a joint homunculus that a hip or knee was "troublesome". Comorbidities were defined using validated algorithms for health administrative data. Using Cox-regressions, we examined the relationship of baseline hip/knee OA (0-2 hips; 0-2 knees) with subsequent incident diabetes as defined from health administrative data (sensitivity - 86%, specificity - 97%), incrementally controlling for age, sex, BMI, preexisting hypertension and cardiovascular disease (CVD), income and prior primary care exposure, and finally walking limitation.
Results: 16,362 participants without baseline diabetes were included: median age 68 years, 61% female and median BMI 25.3 kg/m2. 1,637 (10%) individuals met criteria for hip OA, 2,431 (15%) for knee OA, and 3,908 (24%) for walking limitation. Over a median follow-up of 13 years, 3,539 individuals (22%) developed diabetes. Controlling for baseline age, sex, income, BMI, preexisting hypertension and CVD, and prior primary care exposure, a significant dose-response relationship was observed between number of hip/knee joints with OA and incident

diabetes: HR for two vs. no OA hips 1.25, 95% CI: 1.08-1.44 (p=0.003); HR for two vs. no OA knees 1.16, 95%CI: 1.04 -1.29 (p=0.008). Further adjustment for walking limitation resulted in attenuation of these relationships, which became non-significant.
Conclusion: In a large population cohort aged ≥55 years free of diabetes at baseline and after controlling for multiple confounders, the presence and burden of hip and knee OA was a significant independent predictor of incident diabetes. This association was explained largely by OA-related walking limitation. Increased attention to management of hip and knee OA with a view to improving mobility has potential to reduce risk of incident diabetes.