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MEETING ABSTRACTS

A1
"What Bugs Me": children’s lived experience of asthma
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Introduction: Children learn to adapt to asthma symptoms. Usual questions focused on clinical signs (eg: have you wheezed or used your blue puff today?) can lead to the assumption that asthma is well controlled and has little impact on daily life. More focused queries can lead to better information about asthma control. Parents may not be aware of the impact of asthma on their child.

Objectives: Educators at the Children’s Asthma Education Centre sought ways to help children express the impact of asthma on their daily life, and to improve insight into children’s lived experience of asthma.

Methods: The “What Bugs Me” questionnaire was developed using lived experiences frequently expressed by children with asthma. We began a pilot study with children age 7-11 years attending a Family Asthma Program and subsequently studied both children and parents. Parents and children completed the questionnaire separately and shared their findings at the end of the session.

Results: Surprisingly, 45% of children but only 16% of parents noted they worry about dying (p = 0.014). Fewer children (60% vs 84% parents, p = 0.045) noted nocturnal cough as a problem. More children (52% vs 28% parents, p=0.058) noted they “couldn’t run”.

Conclusion: There were significant disconnects between children and their parents. Asthma Educators and clinicians should direct questions related to the lived experience of asthma to the child. Focused questions can help parents and educators gain insight into the impact of asthma of the child’s social and emotional well being in order to address issues of importance.

Table 1(abstract A1)

<table>
<thead>
<tr>
<th>Issues of concern</th>
<th>Children n = 65 (%)</th>
<th>Parents n = 25 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Coughing at night</td>
<td>39/65 (60%)</td>
<td>21/25 (84%)</td>
</tr>
<tr>
<td>Trouble breathing during gym</td>
<td>37/65 (57%)</td>
<td>14/25 (56%)</td>
</tr>
<tr>
<td>Can’t run</td>
<td>34/65 (52%)</td>
<td>7/25 (28%)</td>
</tr>
<tr>
<td>* Worried about dying</td>
<td>29/65 (45%)</td>
<td>4/25 (16%)</td>
</tr>
<tr>
<td>Coughing with laugh</td>
<td>22/65 (32%)</td>
<td>4/25 (16%)</td>
</tr>
<tr>
<td>Using puffers in public</td>
<td>22/65 (34%)</td>
<td>5/25 (20%)</td>
</tr>
<tr>
<td>Can’t have the pet I want</td>
<td>22/65 (34%)</td>
<td>11/25 (44%)</td>
</tr>
<tr>
<td>Missing activities when sick</td>
<td>22/65 (34%)</td>
<td>8/25 (32%)</td>
</tr>
</tbody>
</table>

A2
Th17 cytokines regulate profibrotic cytokines release by human eosinophils
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Rationale: Asthma is a chronic inflammatory disorder of the lung airways that is associated with airway remodeling and hyperresponsiveness. One of the most critical structural changes that affect airway functionality is fibrotic tissue deposition within the airway wall. Eosinophils have been proposed in different studies to contribute to the production of several mediators and cytokines, including the profibrotic cytokines, TGF-β and IL-11. In this study, we hypothesize that cytokines prevailing in asthmatic tissue such as Th1, Th2, and Th17 cytokines, may induce eosinophils to produce pro-fibrotic cytokines.

Methods: Eosinophils were isolated from peripheral blood of 6 mild asthmatics and 6 normal control subjects. Eosinophils were stimulated with Th1, Th2 and Th17 cytokines and production of profibrotic cytokines, TGF-β and IL-11, were determined using Intra-cellular cytokine detection and FACS analysis, immunohistochemistry, as well as real time PCR.

Results: The level of basal expression of eosinophil TGF-β and IL-11 was significantly upregulated in asthmatic patients compared to healthy individuals. Stimulating eosinophils with Th1 and Th2 cytokines did not induce expression of eosinophils derived profibrotic cytokines. However, stimulating eosinophils with IL-17 resulted in the enhancement of the expression TGF-β and IL-11 in asthmatic individuals.

Conclusions: The regulation of expression of pro-fibrotic cytokines within eosinophils is Th1/Th2 independent. However, IL-17 seems to regulate eosinophil profibrotic cytokine release in asthmatic patients and hence contributing to the accumulation of fibrotic tissue in asthmatic airways.

A3
Effect of histamine strength and devices on skin prick test (SPT) response following antihistamine inhibition
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Background: A histamine positive control (HPC) is used in skin prick testing in order to make sure that the patient has a valid wheal/erythema response. Antihistamines and other factors can suppress the skin response
to allergens. The purpose of this study is to evaluate different histamine concentrations and SPT devices with antihistamine suppressed subjects.

**Methods:** SPT was performed on subjects using multiple allergen extracts and 6 mg/mL and 1 mg/mL histamine base with devices from 2 manufacturers; Lincoln Diagnostics and Hollister-Stier. Some subjects were tested with diluted Timothy grass extract. A single dose of antihistamine, cetirizine, was taken and SPT performed for up to 72hrs.

**Results:** Suppression of wheal responses was significant following antihistamine up to 20 hr for both HPC and most allergens (15% to 70% wheal size in mm). 1 mg/mL histamine appeared negative in some cases under suppression when the 6mg/mL histamine was positive. The lowered wheal size persisted in some subjects up to 72 hrs. Even though the HPC did not appear to be suppressed at some times following antihistamine due to the cutoffs chosen, some allergens that were positive before antihistamines were clearly suppressed and scored a negative result even with positive HPC. SPT results showing suppression also depended on the device. The Lincoln device had a 1.5-3mm larger wheal than the Hollister-Stier device.

**Conclusions:** Some allergens remained suppressed even when the HPC and other allergens returned to their original wheal size. This suggests that antihistamine suppression is not equal across allergens and may result in false negative diagnoses.

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**A4**

**Associations between second-hand smoke exposure in pregnancy and age of childhood asthma development**

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**Background:** Maternal smoking during pregnancy has been associated with an increased hazard of incident childhood asthma. We investigated the association between any second-hand smoke exposure in early life and childhood asthma development.

**Methods:** In the Toronto Child Health Evaluation Questionnaire, parents of 5619 grades 1-2 students reported age of physician-diagnosed asthma development, exposure to maternal and household second-hand smoke during pregnancy and the first year of life, socio-demographic factors, and other early-life exposures such as mold and cockroach. Using Cox proportional hazard models, we evaluated the longitudinal associations between second-hand smoke exposure and age of asthma development.

**Results:** Household second-hand smoke exposure prevalence was 8.3% during pregnancy and 10.6% in the first year of life; 12.5% of children developed asthma. After adjusting for sex, prematurity, being born in Canada and maternal asthma, children exposed to home second-hand smoke during pregnancy were more likely to develop asthma and developed asthma sooner (adjusted hazard ratio (HR) 1.36, 95% confidence interval (CI): 1.09, 1.70), even after excluding children whose mothers smoked in pregnancy (HR 1.53, 95% CI: 1.09, 2.14). The association strengthened (HR 1.88, 95% CI: 1.16, 3.02) after adjusting for home second-hand smoke exposure in the first year.

**Conclusions:** Home second-hand smoke exposure during pregnancy is associated with an increased hazard of childhood asthma development, even if the mother is not a smoker. Recommendations for smoking cessation during pregnancy should focus on pregnant women and members of their households.

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**A5**

**Measured depth of subcutaneous tissue on posterolateral arm of omalizumab patients**

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**Background:** Omalizumab is a humanized antibody utilized for patients with moderate/severe allergic asthma. There is an estimated risk of anaphylaxis to omalizumab in 0.1% of patients. Omalizumab should be received in the subcutaneous tissue of the mid-posterolateral upper arm. There may be an increased risk of anaphylaxis if injections are received intramuscularly (IM). In our clinic, omalizumab is given with BD Eclipse Needle, which is routinely provided with the drug and has needle length 16mm. If a patient has a skin to muscle depth (STMD) less than 16mm, there is a risk of omalizumab being injected IM.

**Methods:** We reviewed charts in an allergy clinic where an ultrasound of the left posterolateral arm was completed to measure STMD. Patients were divided into two groups based on their STMD (>16mm and ≤16mm) and baseline characteristics were compared. We conducted multivariable linear regression with age, sex, BMI and race. The percentages of patients with STMD greater than 4mm, 6mm, 8mm, 10mm, and 12mm were determined.

**Results:** Ultrasounds were completed on 40 patients receiving omalizumab. Three (7.5%) patients examined had >16mm of STMD. Baseline characteristics were consistent between the groups. Sex and BMI correlated with STMD based on the linear regression analysis. Also, 35 (87.5%) patients had >4mm STMD.

**Conclusion:** With provided omalizumab needles, the risk of anaphylaxis may be increased as the injections may be given IM. By reducing the needle length to 4mm, the risk will likely be reduced.
subcutaneous space in the mid-posterolateral upper arm. If the injections are given intramuscularly (IM), there may be an increased risk of anaphylaxis. In our allergy clinic, SIT is given with BD Safety Glide™ allergy syringes with needle length 1.3mm. There is a risk of the SIT being injected IM if patients have a skin to muscle depth (STMD) less than 13mm. Based on the logistic regression analysis, BMI was significantly associated with STMD. There were 168 (90%) patients with more than 4mm STMD. A needle length of 4mm would significantly decrease the risk of SIT being given IM.

Results: Ultrasounds had been completed on 186 patients on SIT. There were 149 (80%) with STMD less than 13mm. Baseline characteristics including age, sex and BMI differed among the two groups (p < 0.05). Based on the logistic regression analysis, BMI was significantly associated with STMD. There were 168 (90%) patients with more than 4mm STMD. With standard allergy syringes, most patients on SIT are at risk of receiving the injections IM. A needle length of 4mm would significantly decrease the risk of SIT being given IM.

A8 Anaphylaxis deaths in Ontario: a retrospective review of cases from 1986 to 2011
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Background: Analysis of mortality data as a result of anaphylaxis may identify risk factors for severe reactions and highlight gaps in management. The primary objective of this study was to identify trends in and potential risk factors for fatal anaphylaxis in Ontario from 1986 to 2011.

Materials and methods: We conducted a retrospective case study using two sources: 1) the Ontario coroner’s database from 2003-2011; and 2) unpublished death reports between 1986 and 2000 gathered by Anaphylaxis Canada. Outcomes of interest included type of allergen, nature of reaction and treatment. Analyses included descriptive statistics and frequency analysis (quantitative data) and grounded theory methodology (qualitative data).

Results: There were 82 anaphylaxis deaths in Ontario in the last 25 years (63 deaths from 1986-2000; 19 deaths from 2003-2011). There was a decline in fatalities due to food allergy, from 32 deaths from 1986-2000 to 2 deaths during 2003-2011. Presumed deaths due to nuts also decreased within these time periods (17 vs 1 death). Among the 82 fatalities, an epinephrine auto-injector was prescribed for 17 patients (21%), only 9 of which (53%) carried it at the time of the reaction. Prior to hospital, only 19 patients (23%) received epinephrine (including by EMS).

Conclusions: This retrospective case study of Ontario fatality indicates a decline in deaths due to anaphylaxis, and possibly decline in the number of deaths caused by food allergy, especially to nuts. The low proportion of patients who were administered epinephrine may indicate that more education is needed for both patients and EMS personnel regarding administration of epinephrine/auto-injectors.

A9 Outcome of diagnostic intervention predicts health-related quality of life scores among children with food allergy
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Allergy, Asthma & Clinical Immunology 2012, 8(Suppl 1):A9

Background: Access to diagnostic care, regardless of diagnostic outcome, may attenuate the negative impact of food allergy on health-related quality of life (HRQL). We sought to determine if improved HRQL can be demonstrated among children, 0-12 years, who receive diagnostic care for food allergy in an allergy clinic setting.

Methods: Parents attending clinic with their child completed the Food Allergy Quality of Life Questionnaire Parent Form before and after their visit. Parents with children on the clinic waitlist served as controls. HRQL scores were analyzed according to visit outcome: fewer or same number of food allergies. A sub-analysis of scores among children who underwent an oral food challenge (OFC) was conducted. The General Linear Model for Repeated Measures was used to compare changes in score over time between outcomes, and to test for interaction between score changes and outcomes.

Results: Mean pre-/post-visit scores were 1.93/1.68 for fewer (n = 64), 2.37/2.37 for same (n = 36), and 1.70/1.79 for controls (n = 59). Interaction between score change and visit outcome was significant (F 3.355, p = 0.037). Pre-/post-visit scores for OFC outcomes only were 2.24/2.03 for fewer (n = 35) and 2.03/2.53 for same (n = 10) number of food allergies. Interaction between score change and OFC outcome was significant (F 5.518, p = 0.023).

Conclusions: Improvement in HRQL associated with food allergy diagnostic care appears to be dependent on visit outcome. Diagnosis of fewer food allergies predicted improvement in HRQL scores among children; this improvement may be most pronounced among those who receive oral food challenges.

A10 Impact of primary food allergies on the introduction of other foods amongst Canadian children
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Allergy, Asthma & Clinical Immunology 2012, 8(Suppl 1):A10

Background: Food-allergic children frequently avoid other foods. We hypothesized that parents of food-allergic children are not given consistent advice regarding introduction of allergenic foods; that these foods are avoided or delayed; and that there is significant anxiety when introducing new foods.

Methods: An online survey was administered via Anaphylaxis Canada’s website to Canadian parents and caregivers who are registered members of this organization and who have a child with a food allergy.

Results: 644 parents completed the online survey (60% male children, average age at diagnosis 21.8 months). The most common allergies were peanut (49%), milk (23%), and egg (18%). 51% of families were given advice regarding the introduction of other allergenic foods, 97% followed through with this advice. 72% were told to avoid certain foods, 41% to delay certain foods, and 14% were given varied advice. 58% of parents avoided or delayed other highly allergenic foods, mainly due to a fear of allergic reaction or anaphylaxis (93%). 69% of children did not have an allergic reaction when these foods were introduced. 68% of parents felt moderate or high levels of anxiety when introducing other foods.

Conclusions: Families of children with food allergies receive varied advice regarding the introduction of new foods. The majority of children did not have an allergic reaction to the new food, even if it was initially avoided or delayed. Most parents feel moderate to high levels of anxiety when introducing new foods to their children. A more consistent approach to this advice may decrease parental anxiety.

A11 Tree pollen allergy in Southwestern Ontario
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Allergy, Asthma & Clinical Immunology 2012, 8(Suppl 1):A11

Background: Cross-reactivity among tree pollens is not as pronounced as that among grass or ragweed pollens. Seasonal pollen counts found in
Figure 1 (abstract A11) Transparent grey color represents the Weather Network pollen counts. Local counts are in color. The width of the bar represents the season, while the height represents quantity of the individual pollens. Note the small quantities of alder, birch and elm. Considerable mulberry, walnut/hickory and cedar/juniper present in our local counts were not reported by the Weather Network.

A12
Infant gut microbiota and the hygiene hypothesis of allergic disease
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Background: Inverse associations between allergic disease and having pets or siblings are commonly attributed to the hygiene hypothesis. As an extension, one could posit that a less diverse gut microbiome in the infant, also linked with the development of allergic disease, would be a function of fewer microbes in the home environment. Piglet studies, however, indicate that greater microbe diversity in the environment actually leads to reduced diversity of the gut microbiota. In this study, we characterize the infant gut microbiota in relation to environmental factors traditionally associated with the hygiene hypothesis.

Methods: The study comprised a small sub-sample of 24 infants from the Canadian Healthy Infant Longitudinal Development (CHILD) birth cohort. Birth mode was obtained from medical records, and mothers reported on pets, siblings, and breastfeeding. Fecal samples were collected at age 4 months, and microbiota composition was characterized by high-throughput 16S rRNA sequencing.

Results: As reported by others, breastfed infants had lower microbiota richness and diversity compared to formula-fed infants. Microbiota richness and diversity were increased in infants living with pets, whereas these measures were decreased in infants with older siblings. Infants living with pets exhibited under-representation of Bifidobacteriaceae and over-representation of Peptostreptococcaceae; infants with older siblings exhibited under-representation of Peptostreptococcaceae.

Conclusions: Two traditionally protective ‘hygiene hypothesis’ factors have opposite effects on infant gut microbiota diversity, while apparently selecting for distinct combinations of intestinal microbes. This suggests that microbiota composition, rather than diversity, may be the more important driver of the ‘microflora hypothesis’ of allergic disease.

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A13
Anaphylaxis to Polysporin® ointment in a pediatric patient
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Background: Topical antibiotics are widely used over the counter preparations to treat and prevent common skin infections. Severe allergic reactions to these preparations are rare. We report a case of anaphylaxis after topical application of Polysporin® ointment.

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Allergy, Asthma & Clinical Immunology 2012, 8(Suppl 1):A13
Case report: A 13 year old male rubbed a white eraser against the dorsum of his hand at school and the skin became abraded with some open areas of broken skin. He applied Polysporin® ointment (polymyxin B sulfate and bacitracin) to the area after he arrived home. Within 15 minutes he developed urticaria on his back, legs and arms. His eyes became very itchy and he developed marked angioedema of his eyelids with urticaria around his eyes. He developed difficulty breathing and described a tight feeling in his chest. He took diphenhydramine and salbutamol via MDI. He did not go to the Emergency Department. His symptoms gradually resolved after approximately two hours. Previous use of Polysporin® in the past did not cause any difficulties. Epicutaneous testing was positive to a 1 in 10 dilution of Polysporin® ointment. Testing was negative to latex. Further testing to the specific components, polymyxin B sulfate and bacitracin is pending.

Conclusion: This patient’s history and skin test results are in keeping with an IgE-mediated reaction to this Polysporin® preparation. Although rare, severe reactions can occur. Health care professionals should be reminded to inquire about previous reactions to topical antibiotics before suggesting their use.

A14 Oral immunotherapy for milk allergy: a systematic review
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Allergy, Asthma & Clinical Immunology 2012, 8(Suppl 1):A14

Background: Milk oral immunotherapy (MOIT) may be an alternative to avoidance in treatment of patients with IgE-mediated cow milk allergy (IMCMA). We aim to determine the effect of MIOT through a systematic review.

Methods: Randomized controlled trials on MOIT were identified from 13 databases, conference proceedings, theses and unpublished trials, as part of a review with the Cochrane Collaboration. A total 1945 records were reviewed and 13 were included, representing 4 studies. Studies were selected and methodological quality assessed independently by two reviewers.

Results: 138 records were reviewed and 13 were included, representing 4 trials. A total of 170 patients were studied (88 MOIT, 82 control). Two studies used blinding and 2 used an avoidance diet control. Fifty-two (59%) patients of the MOIT group were able to tolerate a full serving of milk (about 200mL) compared to 7 (9%) of the control group (RR 6.05, 95% CI 3.2, 11.44). In addition, 26 (30%) in the MOIT group could ingest a partial serving of milk (10-184mL) while none could in the control group (RR 11.55, 95% CI 2.85, 46.87). None of the studies assessed the patients following a period off immunotherapy. Adverse reactions were common (79 of 88 had at least one symptom), although most were local and mild. For every 7 patients receiving MOIT, 1 required intramuscular epinephrine. One patient required it on 2 occasions.

Conclusion: MOIT can lead to desensitization in the majority of individuals with IMCMA although the development of long-term tolerance has not been established.

A15 Vasculitis masquerading as drug allergy: thinking outside the ‘adult’ box of possible diagnoses
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Case report: A 32 year-old male presented with fever and pharyngitis. Amoxicillin was prescribed and 5 days into therapy he developed a petechial rash on the lower extremities, arthritis of the ankles, wrists and elbows, and loose stools. He completed the amoxicillin with no worsening of symptoms. A vasculitis assessment in the Internal Medicine Clinic found a slightly elevated ANA and normal ANCA and hepatitis B/C/HIV serologies, CH50, C3, C4, rheumatoid factor, CBC, electrolytes, coagulation, urinalysis and chest x-ray. Skin biopsy confirmed a neutrophilic small-vessel leukocytoclastic vasculitis (Figure 1). The skin rash and arthritis resolved over the next 4-6 weeks with residual hyperpigmentation and scarring. The symptoms were attributed to a possible drug allergy to amoxicillin and avoidance was recommended.

Two months later, fever and pharyngitis recurred and a similar reaction occurred within 48 hours of azithromycin treatment (Figure 2). A referral was made the Adverse Drug Reaction Clinic. IgE-mediated symptoms were absent. Previous treatments with penicillin were tolerated.

Conclusions: Skin exanthems have a broad differential diagnosis. Henoch-Schonlein-Purpura (HSP) is a small vessel vasculitis with purpura, arthritis, and gastrointestinal symptoms with 90% of cases occurring in children. A dermatology referral was made and the current working
diagnosis is HSP or polyarteritis nodosum (PAN) pending a repeat biopsy during the next acute flare. Skin exanthems are often attributed to concurrent medications. The clinical history in a drug allergy assessment is key in distinguishing hypersensitivity drug reactions from other causes including vasculitis. Drug allergy assessment can prevent unnecessary future antimicrobial avoidance in patients with skin exanthems.

A16
Dilemma of zebras: an unusual case of Hemophagocytic Lymphohistiocytosis
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Allergy, Asthma & Clinical Immunology 2012, 8(Suppl 1):A16

Introduction: Hemophagocytic Lymphohistiocytosis (HLH) is a rare histiocyte disorder associated with perforin-dependent cytotoxic function, characterized by a highly stimulated, but ineffective, immune response to antigens, which results in life-threatening cytokine storm and inflammatory reaction. Both familial and secondary forms have been described. Secondary HLH in associated with infections, malignancies and rheumatological disorders.

Case description: A 26 years old male with past medical history significant for neurosarcoidosis, presented with fever, dyspnea and right upper quadrant pain. He developed respiratory failure and required intubation within 48 hours. He was found to have profound pancytopenia (Hb 66, Platelets 4, WBC 0.7, neutrophils 0.1), hepatosplenomegaly, elevated liver enzymes, CK, ferritin (13080 microgram/l), low fibrinogen (1.4 g/dl) along with CNS lesions, lung infiltrates, proteinuria, renal failure. He had absent NK cell activity but no evidence of hemophagocytosis on his bone marrow or lymph node biopsy. He was treated as sepsis with no improvement. A trial of high dose corticosteroids and Anakinra (Anti IL-1) failed. His clinical condition deteriorated rapidly and he died after episode of massive pulmonary hemorrhage.

Discussion: Secondary HLH is considered less common then familial forms. Although number of studies have suggested higher prevalence, it remains under recognized due to clinical similarities to severe sepsis making diagnosis difficult. HLH is an important consideration for critically ill patients not responding to conventional therapy.

A17
Effects of omalizumab on chronic urticaria not responding to recommended therapy
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Background: Treatment of chronic urticaria consists of antihistamines as the first-line treatment. For more severe symptoms, combinations can be necessary as well as dose augmentations. The recent guidelines suggest the possibility of using omalizumab in resistant cases. We treated 2 patients with cold-urticaria (CO), 1 with cholinergic urticaria(CH) and 11 with chronic spontaneous urticaria (CSU) with omalizumab, who had not benefited from the recommended first-line, second-line and third-line treatments.

Methods: Patients were required to document their CU symptoms once daily with urticaria activity scores for 7 days (7UAS). Briefly, the symptoms were monitored in terms of numbers of wheals [none (=0 points), <10 (=1 point), 10–50 (=2 points), or >50 per day (=3 points)], and the intensity of their pruritus [none (=0 points), mild (=1 point), moderate (=2 points), severe (=3 points)], for a total of 42 points. To evaluate the efficacy of the omalizumab treatment, 7UAS obtained at baseline was compared to that at the third and sixth month of the therapy. Omalizumab was given at 150ug/month irrespective of IgE levels and increased to 300 mg if needed (no response). The concomitant medication was slowly reduced according to clinical response.

Figure 1(abstract A17)
Results: The 7UAS improved significantly in all severe urticaria patients with omalizumab as early as one month (not shown) after initiation of therapy and was sustained for the 6 month observation (Figure 1). The 7UAS in patient #8 was >30 previously but =0 at entry because treated with oral prednisone for >1 year. The response was not satisfactory for patient #10 and omalizumab increased to 300mg after 6 months with a better clinical response (not shown). Along with the clinical improvement, the concomitant medications could also be reduced significantly in all patients except #10, particularly prednisone.

Conclusion: Our results show that omalizumab improves significantly recommended treatment-resistant urticaria patients (13/14) in terms of clinical symptomatology (7UAS) and drug reduction in a real life setting. None of the patients reported any adverse effect.

A18 Peripheral edema in a diabetic patient on ACE inhibitor: differential diagnosis
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Case history: 44 years old man who complained of painful edema of both hands and feet with limited range of motion that interferes with his work (computer). On physical exam, the skin of the hands was thick and tight with clear limitation of motion. A pitting edema was seen on both feet. BP was 140/90 and no synovitis was documented. He developed paresthesia on both hands, mostly during the night, and severe carpal tunnel syndrome was documented (proven by EMG). Then, an inability to press the palms together without a gap (called prayer sign) was documented. Past history reveals insulin-dependent diabetes and HBP (on Altace). The complete blood work-up was within normal limits except positive ANA 1:2560, nuclear pattern with anti-DNA andENA negative. Because of an inflammatory condition was first suspected, he was placed on prednisone 50 mg daily x2W with no change. The ACE inhibitor was then suspected to be involved in a bradykinin-induced angioedema and was stopped. The patient treated with plasma-derived C1 inhibitor (Berinert) 1500U.(I.V.) and the initial therapeutic response was modest; with further infusion, no significant change was observed. He did not respond either to anti-bradykinin therapy (ICATIBANT) 30 mg (S.C.).

Conclusion: The whole condition suggests that a rare musculoskeletal complication of long lasting diabetes, called diabetic cheiroarthropathy or diabetic stiff hand syndrome. The underlying cause is multifactorial: increased glycosylation of collagen in the skin, decreased collagen degradation, diabetic microangiopathy and possibly neuropathy. What is unique in this case is the involvement of lower limbs with edema, which had never been reported previously. No specific treatment is of this clinical condition is available at present time.

Summary: We reported a case of peripheral thickening of the skin of both extremities that could be misleading for arthritis or bradykinin-induced angioedema. It is unique in its distribution on upper and lower extremities.

A19 Evaluation of safety and efficacy of a 20% Subcutaneous Immunoglobulin (Hizenta®), after a dose equivalent switch from intravenous or subcutaneous replacement therapy in a cohort of primary immunodeficient patients
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Objectives: To assess the safety and efficacy of Hizenta®, a 20% human IgG for subcutaneous administration, in a cohort of patients with primary immunodeficiency disorders (PID) after a dose equivalent switch from their previous treatment.

Methods: A cohort study of 57 PID patients was reviewed 3 months post-transition to the 20% Subcutaneous Immunoglobulin (Hizenta®), in order to evaluate clinical outcomes and adverse events related to a dose-equivalent switch from 10% liquid solution intravenous (Privigen® and Gamunex®) or 16% subcutaneous replacement therapy (Vivaglobin®) to weekly infusion of Hizenta®. Descriptive analyses were performed in relation to IgG levels, total infusion volume and infusion time.

Results: Mean age of patients was 51.8 years old. The study showed IgG levels achieved with Hizenta®, were similar to pre-study levels with subcutaneous and higher by 17.1% compared to intravenous IgG. Local reactions were minimal and only one Hizenta®-related adverse event was reported. Generally, lower infusion volume with Hizenta®, also led to a reduction in total infusion time and in the number of infusion sites compared to other subcutaneous replacement therapy.

Conclusions: Switching to Hizenta®, maintained serum IgG levels without dose increases, overall reduction in infusion time and infusion sites. It therefore confirms that for our cohort, this new strategy is practical while being similar in effectiveness and safety to both intravenous and subcutaneous replacement therapy.

A20 Economic benefit of subcutaneous rapid push versus intravenous immunoglobulin infusion therapy in adult patients with primary immune deficiency
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Background: Primary immune deficiencies (PID) are genetic disorders resulting in recurrent infections. Immunoglobulin replacement therapy in PID patients can be achieved intravenously (IVIG) or subcutaneously (SCIG) with similar efficacy and safety profiles but with different resource use and associated costs.

Methods: SCIG and IVIG options for immunoglobulin replacement therapy in adult PID patients were compared in a cost-minimization model over three years of treatment. The model focused on direct medical costs for infusion supplies and personnel. A three-year budget impact model assessed the economic impact on the healthcare system of switching from IVIG to SCIG for PID patients of the BC Central Transfusion Registry. Sensitivity analyses were performed for both models to measure the effect of different modalities of IVIG treatment and of the proportion of patients switching from IVIG to SCIG.

Results: The cost-minimization model estimated SCIG treatment cost per patient over three years at $1978 compared to $7714 for IVIG, resulting in savings to the healthcare system of $5736, principally due to reduced hospital personnel costs. This figure varied from $5035 to $8739 for different modalities of IVIG therapy. Assuming that 50% of patients who received IVIG switched to SCIG, the budget impact model estimated cost savings for the first three years at $1,307,894 or 37% of the personnel and supply budget.

Conclusion: This study demonstrated that rapid push home-based SCIG was less costly than hospital-based IVIG for immunoglobulin replacement therapy. This approach provides not only a beneficial option from the patient perspective but also results in significant savings to the healthcare system for immunoglobulin replacement therapy in adult PID patients in a Canadian context.

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A21 Infliximab-graded challenge in a patient with Crohn’s disease and adalimumab hypersensitivity
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Background: Infliximab and adalimumab are monoclonal antibodies to tumor necrosis factor alpha (TNF-α) used in the treatment of various inflammatory disorders. Infliximab, a chimeric monoclonal antibody, is postulated to be more immunogenic as it is not entirely humanized. Despite reports of adalimumab treatment in patients after an adverse reaction to infliximab, there is a paucity of literature reporting the converse - treatment with infliximab after adverse reaction to adalimumab. Thus, it is difficult to estimate the risk of cross-sensitization. Graded drug challenges are utilized for patients unlikely to be allergic to a specific drug, but where concern for a reaction remains.

Objective: To present a patient with Crohn’s disease and prior hypersensitivity to adalimumab who successfully underwent a graded intravenous challenge with infliximab.

Methods: The patient previously had acute generalized urticaria due to adalimumab, with corresponding positive intradermal skin tests. Because her bowel disease activity was severe, her gastroenterologist preferred to start another anti-TNF α agent. Infliximab was the chosen alternative. She underwent an infliximab-graded challenge in an outpatient clinic staffed by trained allergists.

Results: The patient received infliximab during the graded challenge without adverse reactions.

Conclusions: This is the first case, to our knowledge, to demonstrate an infliximab-graded challenge for a patient with a prior reaction to adalimumab. For patients requiring TNF-α inhibitors, but with previous reactions and concern for cross-sensitization, a graded challenge with the first dose of an alternate agent under observation by care providers trained to manage adverse drug reactions, may be a safe approach.

A22

Functional common gamma chain is not required for mast cell proliferation and survival

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Background: IL-15 is involved in the development and homeostasis of CD8 T lymphocytes, NK and iNKT cells, and intraepithelial lymphocytes. It also promotes migration, proliferation and survival of mast cells. Its receptor on lymphocytes is a heterotrimeric complex which shares the IL2-R gC chains. IL-15-mediated signaling in mast cells might make use of an alternative receptor provisionally designated as IL-15RX. In a murine model, gC-dependent signaling was shown to be essential for IL-4 and IL-9-induced proliferation and survival of mast cells, but not IL-15 even in the wild-type mouse.

Methods: Skin biopsies of BCGItis lesions from 6 X-SCID patients were reviewed. Immunostaining using anti-CD117 (1/400, DAKO lab) and tryptase (1/400, DAKO lab) antibodies was performed. A similar BCGItis lesion from a patient with RAG SCID was tested with the same 2 antibodies as controls.

Results: Mast cells were present in the skin biopsies of all patients presenting with X-SCID; their number was not decreased compared to normal skin biopsies. The number of mast cells in the skin biopsy of the RAG SCID patient was also normal.

Conclusion: These results suggest that, in humans, gC is not required for mast cell proliferation and survival. Its impact on IL-15-dependent migration and the possible role of IL-15RX warrant further studies.

A23

Experience with subcutaneous immunoglobulin therapy in two pediatric cases of immune thrombocytopenia purpura

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Background: Immune thrombocytopenia purpura (ITP) can co-exist with primary immunodeficiencies. Intravenous immunoglobulin (IVIG) therapy is an effective treatment. Subcutaneous immunoglobulin (SCIG) formulations that can be home-delivered have recently been developed. We describe 2 cases of pediatric ITP associated with hypogammaglobulinemia, treated with SCIG.

Case description: Case 1: A 14-year-old male presented with a symptomatic thrombocytopenia. Infusions of IGIV led to an immediate improvement in platelet count. However, he experienced post-infusion intractable headaches, nausea and vomiting, which recurred after subsequent infusions. Intravenous anti-D therapy resulted in a severe allergic reaction. Short course prednisone protocol was implemented for symptomatic episodes. Preliminary blood work for splenectomy revealed low IgG level. The patient was put on SCIG replacement therapy (116 mg/kg/week). He experienced only one relapse since, which remained corticosteroid-sensitive.

Case 2: A 14-year-old male was referred for asymptomatic thrombocytopenia. Extensive work-up was normal. He was administrated IVIG after which the platelet count quickly normalized. Eighteen months later, he developed monoarthritis and generalized adenopathies. Dominant lymph node biopsy showed reactive lymphoid hyperplasia. The patient started to experience recurrent thrombocytopenia flare-ups, needing monthly IVIG. Laboratory results indicated low IgM and IgG levels. To prevent further episodes, he received prophylactic monthly IVIG for 6 months before switching to SCIG (135 mg/kg/week). Platelet and also neutrophil levels normalized, which was not achieved with IVIG. In both patients, SCIG therapy was well-tolerated with no adverse events occurring.

Conclusion: These results suggest that SCIG can be an effective and convenient treatment of pediatric ITP.

A24

Patient with X-linked phenotype of SCID, markedly skewed maternal X-inactivation, but normal common gamma chain (CD132) gene ORF sequence

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Background: A 7.5-month-old male presented with increasing respiratory distress progressing to severe hypoxia, an erythematous scaling rash and a paucity of lymphoid tissue. Chest x-ray revealed bilateral pneumonia with diffuse alveolar opacities. He had an increased neutrophil count, normal hemoglobin and platelet count, and an absolute lymphocyte count of 4.3 x 10^9/L decreasing to 1.8 x 10^9/L. IgG was 1.72 g/L, IgA 0.59 g/L and IgM 1.08 g/L, but no antibody to tetanus, diphtheria or pneumococcus despite immunization. Nasopharyngeal aspirate demonstrated rhinovirus by PCR, and tracheal aspirate was positive for Pneumocystis jiroveci by immunofluorescence. Lymphocyte markers showed: 62% CD19+ cells, 15% CD4+ cells and 0.5% NK cells. CD4+ cells were 90% CD45RO+, 8% CD45RA+ and 5% were CD25+. His cells had no proliferative response to anti-CD3 or IL-2 stimulation, a weak response to PHA, and no response to antigen or MLR. BMT was performed from a HLA-identical sister and the patient is well 7 months post BMT.

Conclusion: The decreased and non-functional T cells, absence of NK cells and normal number of B cells, and lack of proliferation to IL-2 is typical of X-linked common gamma chain or JAK3 deficient SCID. DNA sequencing showed no sequence variants in the ORF of the common gamma chain, but the patient’s mother has an abnormal lymphocyte
subset profile and maternal T cells are markedly skewed to use one X-chromosome (non-random), while B cells demonstrate random X-inactivation. Investigations are underway to assess whether this patient has an unusual form of X-linked SCID.

**A25** Allergen specific sublingual immunotherapy (ASSIT) reduces IL-4 and enhances interferon-gamma intracellular expression by CD8+ T-cells in perennial allergic rhinitis (Par)

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**Background:** ASSIT is a novel therapy of allergic diseases that gained significant acceptance over the past decade. This study was undertaken to investigate whether ASSIT in Par may influence the Intracellular expression of IFN-gamma and IL-4 by CD3+ CD8+ T-cells.

**Subjects and methods:** Twenty adult PAR patients sensitive only to the mitre D.farinae as diagnosed by Prick skin testing (PST) (Omega labs, Montreal, Canada) were included in the study. ASSIT to D. farinae was administered for 6 months. Flow cytometric evaluation of the intracellular expression of IL-4 and IFN-gamma by CD3+ CD8+ T-cells was determined according to Manufacturer instructions (Beckton Dickinson) before and after ASSIT. The total 5 symptom score (TSSS) of PAR and the diameter of PST were also examined.

**Results:** After ASSIT, the percentage of IL-4 expressing CD8+ T-cells significantly decreased from [0.69 +/- 0.18] to [0.33 +/- 0.13] and the percentage of IFN-gamma expressing CD8+ T-cells significantly increased from [4.63 +/- 1.29] to [7.20 +/- 2.09]. The TSSS and the PST diameter also significantly decreased.

**Conclusion:** In this study the favorable clinical response induced by ASSIT in Par correlated with the decrease in the percentage of Tc2 cells and the increase in the percentage of Tc1 cells.

**A26** Improved quality of life with home therapy with subcutaneous immunoglobulins for patients with secondary hypogammaglobulinemia

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**Background:** We reported 10 cases where SCIg turned out to be the preferred route of Ig replacement therapy for patients who developed secondary hypogammaglobulinemia following bone marrow transplantation or chemotherapy treatment for neoplasia. Patients’ age ranged from 2 to 19 years old, 7 patients being below the age of 10. Six out of the 10 patients were transitioned from IVIg to SCIg: 4 patients due to systemic side effects associated to IVIg perfusions and 2 patients due to poor quality of life related to frequent travels to the hospital for IVIg infusion. Four out of the 10 patients were Ig naïve patients and were started directly on SCIg. All patients received a weekly dose of 100mg/Kg infused in two different sites assisted by a battery-powered pump. Patients were given a 1:1 dose when transitioned from IVIg to SCIg. A significant increase of the IgG level was noted in all patients. All patients tolerated very well SCIg therapy with no reported systemic adverse reactions. Local infusion sites reactions were the most frequent observed reactions with a frequency similar to the one observed in patients with primary immunodeficiency disorders (PIDD). Lastly, parents reported improvement in quality of life under SCIg therapy; their child had improved social functioning, better resistance against infections and much improved overall health.

**Conclusion:** While home-based SCIg administration relative to hospital-based IVIg has been shown to improve PIDD patients’ quality of life, we believe that SCIg has the potential to improve patient’s satisfaction and independence also in patients with secondary hypogammaglobulinemia.

**A27** Do 3rd year medical students know how to use allergy and asthma devices?

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**Introduction:** It is expected that by the end of 4 years of medical training, medical students should be comfortable with the teaching and use of asthma and allergy devices. We sought to determine third-year medical students’ comfort levels in the use of these devices and evaluated the effectiveness of a medical device training seminar.

**Methods:** 65 third-year medical students participated in an asthma and allergy device training seminar provided by Windsor Allergy and Asthma Education Centre during their Pediatrics core rotation. The students’ comfort levels with the use of 7 devices were self-graded on a scale of 1-10 prior to training, and then again immediately after. Students’ interests in either medical or surgical specialties, presence of asthma and/or allergy conditions in the students, and stages of clinical training were collected. Mean comfort level scores before and after the training were compared using a paired t-test.

**Results:** Prior to the seminar, mean comfort level scores ranged from 1.78 to 3.66 for each medical device. Scores were consistently low, regardless of the students’ interests in particular specialties. Mean scores ranged from 8.65 to 9.15 after the seminar, which represented a significant increase for every device (p < 0.05).

**Conclusion:** Third-year medical students were not comfortable with the use of asthma and allergy devices. A medical device training seminar increased the trainees’ comfort level and should be considered as a regular part of the clinical training curriculum. Further study is warranted to determine whether the improved comfort level is retained at the end of 4-years of medical training.

**A28** The impact of mobile point of care interaction on the September asthma epidemic: a randomized pilot study

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**Objective:** To prevent asthma exacerbations during the fall asthma epidemic utilizing weekly short text messaging focusing on asthma symptoms and control.

**Methods:** A prospective pilot study of text messages sent to asthma patients between the ages of 11-21 was performed. The control group received texts focusing on healthy living and activity. Recruitment and the intervention occurred in the summer and fall of 2011. Asthma Control Test (ACT) scores and the number of asthma exacerbations requiring physician intervention were primary outcomes. Secondary outcomes included SMS response rates and times. Qualitative outcomes included patient and caregiver satisfaction with the intervention.

**Results:** Seventeen patients participated, although three did not complete the study. The average age was 14.9 ± 2.5 (range 12-20). ACT scores were significantly better in the intervention group than in the control group at the end of September (21.3 ± 2.1 vs 16.0 ± 5.0 p < 0.05).
Exacerbations were significantly more frequent in the control group than the intervention group (5 vs 0, p = 0.009). Text response rates were more frequent and quick in those receiving the intervention versus controls (78% response rate with a 12 minute average vs 58% with a 266 minute average). Participants and primary caregivers believed the intervention improved communication with their medical team.

**Conclusion:** There was significant improvement in asthma control and exacerbations with the use of weekly short text messages about asthma symptoms and asthma control in this pilot study. Further investigation of this easy to implement, inexpensive, and teen approved intervention’s utility in improving asthma management is certainly warranted.

Cite abstracts in this supplement using the relevant abstract number, e.g.: Cameron et al: The impact of mobile point of care interaction on the September asthma epidemic: a randomized pilot study. *Allergy, Asthma & Clinical Immunology* 2012, 8(Suppl 1):A28