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MEETING ABSTRACTS

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Allergic Rhinitis/Asthma

#01

Hot spots for pediatric asthma emergency department visits in Ottawa, Canada

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Allergy Asthma Clin Immunol 2021, **17(Suppl 1):**01

Background: Pediatric asthma emergency department (ED) visits and repeat visits place a significant burden on healthcare. National and provincial level studies demonstrate geographic variation in asthma ED visits and links to marginalization, but preclude translation into practical targeting of healthcare delivery. It is important to understand the relationship between pediatric asthma ED visits and marginalization at a more granular level. Our objective was to map the city-level geographic variation in pediatric asthma ED visit and re-visit rates in Ottawa, Canada and the relationship with marginalization.
Methods: We performed a single centre retrospective cohort study of children ages 1–17 with one or more ED visits for asthma at the Children's Hospital of Eastern Ontario. Using postal codes, we linked patients to census tracts. Per census tract, we mapped pediatric asthma ED visit and re-visit rates within 1 year and identified overlap with the Ontario Marginalization Index.
Results: Of 1,620 children with an index ED visit, 18.5% had a repeat ED visit. We identified 10 hot spot census tracts each for pediatric asthma ED visit and re-visit rates. We identified an overlap between urban hot spots and areas with high marginalization with respect to residential instability, material deprivation and ethnic concentration.
Conclusions: At a granular, city-wide level, pediatric asthma ED visit and re-visit rates are heterogeneous. Urban hot spots, in contrast to rural, have more overlap with marginalization. These methods can be used in other jurisdictions to inform practical community strategies for geographically-targeted prevention of pediatric asthma-related ED visits in vulnerable areas.

#02

A mild case of COVID-19 infection in a 69-year old male with severe eosinophilic asthma on mepolizumab

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Allergy Asthma Clin Immunol 2021, **17(Suppl 1):**02

Background: Since the emergence of COVID-19, clinicians have struggled to predict which patients will have more severe clinical courses. The CDC has listed moderate-severe asthma as a possible risk factor for severe COVID-19 infection. Type 2 targeted biologic treatments are recommended as add-on therapy for moderate-severe asthmatics with uncontrolled symptoms. We hypothesize that achieving good control of chronic asthma through the use of these agents will allow patients to have improved outcomes. As such, we describe a reassuring case of COVID-19 in a severe eosinophilic asthmatic on mepolizumab.
Case Presentation: We present a 69-year old Caucasian male with late-onset eosinophilic non-atopic asthma controlled on mepolizumab with a baseline FEV1 of 96% and absolute eosinophil count of 1300 cells/μmol. His medical history was significant for obesity (BMI 31) and remote 14-pack year smoking history but no cardiac comorbidities. On March 29th, 2020, he tested positive for COVID-19 after 2 days of worsening symptoms with known exposure. His presenting symptoms consisted of a dry cough and headache for 3 days which progressed to profound fatigue followed by arthralgias and myalgias. His monthly mepolizumab was withheld and he was temporized with high dose mometasone/formoterol and tiotropium inhalers. He recovered completely at home within one-week without needing prednisone, antibiotics, emergency department, or hospitalization. Mepolizumab was restarted on May 27, 2020.
Conclusions: Despite advanced age, obesity, and severe eosinophilic asthma, our patient had only a mild infection with COVID-19. This case highlights the importance of achieving optimal asthma control with the established array of asthma therapies, including biologic targeted treatments against IL-5, to prevent a severe exacerbation with this novel respiratory infection. Dedicated cohort and mechanistic studies

with well characterized asthmatics with COVID-19 are needed to more clearly understand risk and severity outcomes as well as to clarify guidance on withholding or continuing biologics in asthmatics infected with COVID-19.

Statement of Consent: Written informed consent for this case report was obtained from the patient.

#03

Investigating autoantibody-mediated macrophage dysfunction in severe asthmatics with recurrent infections

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Allergy Asthma Clin Immunol 2021, **17(Suppl 1):**03

Background: Increased levels of sputum autoantibodies (aAbs) were reported in the airways of severe eosinophilic asthmatics with recurrent infective bronchitis, referred to as a mixed phenotype (Mukherjee et al. JACI 2018). We hypothesized the presence of autoantibodies against macrophage scavenger receptors affect monocyte and macrophage response to infection and contribute to infection susceptibility.
Methods: Sputum anti-eosinophil peroxidase (EPX) IgG and anti-macrophage receptor with collagenous structure (MARCO) titers were determined by in-house developed ELISA. Adherent mononuclear cells (predominant monocyte population) were isolated from peripheral blood of n = 4 healthy volunteers and used directly or differentiated into monocyte-derived macrophages (MDMs). MDMs and monocytes (at 2×10^5 cells/well) were incubated with 2 µg eluted immunoprecipitated immunoglobulins (IP-Igs) from sputa with high anti-MARCO titers (n = 10) or non-specific IgG from healthy donors (ChromPure, Jackson ImmunoResearch) for 48 h at 37 °C ± 100 ng/mL lipopolysaccharide (LPS) and assessed for cytokine release (Eve Technologies, Alberta).
Results: Anti-MARCO IgG was detected at high titers (up to 1:16) in n = 81 eosinophilic asthmatics(EA) with recurrent infections (mixed granulocytic sputa), compared to n = 47 prednisone-dependent EAs, n = 42 ICS-dependent EAs, n = 16 neutrophilic, n = 7 paucigranulocytic asthmatics and n = 16 healthy volunteer sputa ($P < 0.05$, 2-way ANOVA). The anti-MARCO IgG positively correlated with anti-EPX IgG ($R = 0.87$, $P < 0.0001$) and markers of airway infection, sputum total cell count ($r = 0.32$, $p < 0.0001$) and absolute sputum neutrophils ($r = 0.23$, $p = 0.001$). Monocytes and autologous MDMs incubated with IP-Ig with high sputum aAb titers showed a significant decrease in IL-6, IL-10 and granulocyte macrophage-colony stimulating factor, while monocytes showed reduced interferon-gamma and IL-1b release compared to non-specific IgG controls ($p < 0.05$, 2-way ANOVA, Tukey's correction) in response to LPS.
Conclusions: We report that presence of sputum aAbs against Mφ proteins, in particular scavenger receptors, could impede effective host defense and lead to recurrent infective bronchitis in eosinophilic asthmatics.

#04

Clinical validation of the environmental exposure unit for house dust mite exposure

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Allergy Asthma Clin Immunol 2021, **17(Suppl 1):**04

Background: The Environmental Exposure Unit (EEU) is a controlled allergen exposure facility used to study allergic rhinitis (AR). It has been previously evaluated for use with seasonal allergens including ragweed, birch, and grass pollens. To study the perennial allergen, house dust mite (HDM), a dedicated room was constructed within the EEU, termed the HDM-EEU. This study serves to clinically validate the HDM-EEU for HDM-induced AR.
Methods: Eligible HDM-allergic participants were invited to a 3-h HDM exposure session in the HDM-EEU following confirmation of relevant clinical history and positive skin prick tests to *Dermatophagoides pteronyssinus* (*D. pteronyssinus*) and *Dermatophagoides farinae* (*D. farinae*). Participants were trained to collect AR data, consisting of Total Nasal Symptom Score (TNSS) and Peak Nasal Inspiratory Flow (PNIF). TNSS and PNIF were recorded at baseline, every half an hour while in the HDM-EEU, and on an hourly basis for up to 24 h following the termination of allergen exposure. Blood samples for biological analyses were collected pre- and post-allergen exposure.
Results: A total of 44 allergic and 11 non-allergic participants were included in this study. Compared to controls, HDM-allergics had significantly elevated TNSS ($p < 0.05$) for up to 6 h post-exposure and significantly decreased % PNIF change ($p < 0.05$) from baseline at hours 2 and 3 while in the HDM-EEU. Strong correlations observed between TNSS vs PNIF ($R^2 = 0.9254$) and PNIF vs nasal congestion ($R^2 = 0.9388$) suggest that participants were effectively trained to report their symptoms accurately. Serum analyses revealed significantly elevated concentrations of specific immunoglobulin E (sIgE) against *Der p 1* and *Der f 1* ($p < 0.0001$) in HDM-allergics than non-allergics, with a strong correlation in sensitization to both allergens ($R^2 = 0.9439$).
Conclusions: The HDM-EEU is a suitable clinical model to induce AR symptoms in HDM-sensitized participants to investigate its symptomatic and biological manifestations.

#05

Staphylococcus aureus carriage and biological responses of ragweed pollen-induced allergic rhinitis using the nasal allergen challenge model

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Allergy Asthma Clin Immunol 2021, **17(Suppl 1):**05

Background: Little is known about the impact of the nasal microbiome on allergic rhinitis (AR). The current study aimed to determine if Ragweed (RG)-allergics were more likely to be colonized with *Staphylococcus aureus* in the anterior nares using the nasal allergen challenge model (NAC).
Methods: Consenting individuals (20 RG-allergic and 11 non-allergic) were screened for *S. aureus* colonization with a nasal swab before receiving increasing concentrations of ragweed pollen extract intranasally until each participant achieved qualifying criteria for a positive NAC (Total Nasal Symptom Score(TNSS) ≥ 8 and %Peak Nasal Inspiratory Flow(PNIF) fall ≥ 50%). 15 RG-allergic and 9 non-allergic participants qualified for NAC. Peripheral blood samples were collected at baseline, 1 h, 6 h, and 24 h post-NAC. RG-specific IgE (sIgE) was measured using ImmunoCAP assays from the collected serum. All statistical analyses were performed using GraphPad Prism 7.0.
Results: Seven consenting individuals were colonized with methicillin-sensitive *S. aureus*. 85.7% of *S. aureus* carriers were RG-allergic (n = 6), and 14.3% were non-allergic (n = 1). Peripheral blood eosinophil levels were significantly decreased in RG-allergics 1 h and 6 h post-NAC compared to baseline (both, $p < 0.05$). There were no significant differences in white blood cell counts between RG-allergics and non-allergics at baseline, 1 h, 6 h, or 24 h post-NAC. RG-sIgE levels were significantly higher in RG-allergics than non-allergics ($p > 0.0001$). RG-allergics colonized with *S. aureus* had significantly greater blood