fewer attacks/month compared with those receiving placebo (0.31–0.48 vs 2.46 attacks/month, respectively).
**Conclusions:** Lanadelumab resulted in a marked suppression of kallikrein activity at drug levels approximately equimolar to the amount of protease, resulting in sufficient inhibition for effective HAE prophylaxis.

## A64

### Efficacy of lanadelumab in the Phase 3 HELP study: Exploratory analyses based on prior disease activity and prior use of C1-INH long term prophylaxis therapy

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**Background:** The HELP Study evaluated the efficacy and safety of lanadelumab for long-term prophylaxis (LTP) in patients ≥ 12 years old with HAE type I/II (NCT02586805). Here, we report lanadelumab efficacy based on a patient's prior disease activity and prior use of C1-INH LTP.
**Methods:** The HELP study is a phase 3, randomized, double-blind, placebo-controlled study. We performed two exploratory efficacy analyses: (1) a responder analysis comparing normalized HAE attack rates over 26 weeks of treatment to a 4–8 week run-in period prior to treatment with lanadelumab and (2) a Poisson regression model to compare the mean HAE attack rate in the lanadelumab groups to placebo by patient prior C1-INH LTP use.
**Results:** Over the 26-week treatment period, the percentage of patients with a ≥ 50%, ≥ 70%, and ≥ 90% reduction in investigator-confirmed HAE attacks from the run-in period, respectively, was 89.3%, 78.6% and 64.3%, [lanadelumab 150 mg q4wks (n = 28)]; 100%, 75.9%, 55.2% [lanadelumab 300 mg q4wks (n = 29)]; 100%, 88.9% and 66.7% [lanadelumab 300 mg q2wks (n = 27)] and 31.7%, 9.8% 4.9% [placebo (n = 41)], respectively. In C1-INH LTP patients (n = 60), the attack rate was significantly reduced in all lanadelumab groups versus placebo (P < 0.001); the reduction was similar in magnitude to those who did not receive prior LTP (n = 55). For the lanadelumab 150 mg q4wks, 300 mg q4wks, 300 mg q2wks and placebo groups, respectively, C1-INH LTP users reported mean monthly attack rates (3 months prior to the study) of 3.0, 2.7, 2.6 and 4.0; during run-in 3.3, 3.7, 4.6 and 4.6; and during the treatment period 0.5, 0.7, 0.5 and 2.9.
**Conclusions:** Treatment with lanadelumab for 26 weeks resulted in a high rate of patients who experienced a clinically meaningful reduction in investigator-confirmed HAE attacks compared to baseline run-in. Furthermore, all lanadelumab doses significantly reduced attack rates versus placebo, regardless of whether patients had received prior C1-INH LTP.

## A65

### Alterations in cord blood hemopoietic progenitor cell surface receptor expression precede atopy and poor lung function at 1- and 3-years in the Canadian Healthy Infant Longitudinal Development Study

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**Background:** Hemopoietic progenitor cells (HPC), both in the bone marrow and in peripheral tissues, differentiate towards inflammatory effector cells and, thus, can modulate central and peripheral inflammation. There is growing evidence for the involvement of hemopoietic processes in the pathogenesis of atopy and asthma from pre-conception and birth. This is the basis for the "bone marrow" hypothesis of allergic disease, arguing that a perinatal environmental challenge leads to the skewed production and mobilization of HPC, regulating central and peripheral production of cell types that perpetuate allergic responses. The objective of this study was to assess the association of cell surface receptor profiles of cord blood (CB) HPC with atopy development and lung function at 1- and 3-years in the Canadian Healthy Infant Longitudinal Development (CHILD) Study
**Methods:** We used six-colour flow cytometry to assess cytokine and toll-like receptor expression levels in CB HPC from infants with atopy data (defined as positive skin prick test and atopic dermatitis and wheeze) and lung function data (by lung clearance index (LCI)) at 1- and 3-years of age in CHILD.
**Results:** We found a significant increase in IL5R and IL17RB-expressing HPC populations in the CB of children atopic at 1-year. Conversely, GM-CSFR and ST2-expressing CB HPC were decreased in atopic children both at 1- and 3-years. The expression levels of IL17RB on the surface of CB-HPC were higher in atopics at 3-years. Finally, infants with poor lung function at 3-years exhibited higher IL5R expression on the surface of CB HPC.
**Conclusion:** This study provides evidence of pre-existing cellular alteration in the infants' CB progenitors at birth, which antedate development of atopy/allergic disease and potentially future asthma. Our results can contribute to novel strategies for atopic/allergic disease interception in infants before onset, and hence participate in the health and well-being of Canadian children.

## A66

### Efficacy and safety of lanadelumab for prevention of hereditary angioedema attacks: results from the phase 3 HELP Study

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**Background:** The efficacy and safety of lanadelumab, a fully human monoclonal antibody inhibitor of plasma kallikrein, in preventing hereditary angioedema (HAE) attacks were evaluated.
**Methods:** In the randomized, double-blind, placebo-controlled, parallel arm, multi-center phase 3 HELP Study (NCT02586805), patients $\geq$ 12 years old with HAE type I/II and $\geq$ 1 attack during a 4-week run-in period received subcutaneous injections of placebo or lanadelumab (150 mg q4wks, 300 mg q4wks, or 300 mg q2wks) for 26 weeks (days 0–182).
**Results:** Of 125 enrolled patients (mean age 40.7 yrs; 70.4% female; 90.4% Caucasian); 113 completed the study. Over 26 weeks, lanadelumab reduced the number of attacks versus placebo by 75.6%, 73.3%, and 86.9% in the 150 mg q4wks, 300 mg q4wks, and 300 mg q2wks groups, respectively; all adjusted $p < 0.001$. The attack rate compared with run-in was reduced by $\geq$ 50% in 89.3%, 100%, and 100% of patients in the lanadelumab groups, respectively (31.7% placebo). The rate of moderate/severe attacks was reduced by up to 83.4% versus placebo, and up to 44.4% of lanadelumab-treated patients (2.4% placebo) were attack-free. During steady state (days 70–182), the efficacy of lanadelumab was more pronounced: the number of attacks versus placebo was reduced by 77.6%, 80.6%, and 91.5%, respectively; the rate of moderate/severe attacks was reduced by up to 88.4% versus placebo; and up to 76.9% of lanadelumab-treated patients were attack-free (2.7% placebo). There were no treatment-related serious AEs or deaths. The most common AEs were injection site reactions. Most AEs were mild to moderate in severity.
**Conclusions:** Lanadelumab significantly reduced the number of attacks and number of moderate/severe attacks over 26 weeks versus placebo. Most patients experienced an attack rate reduction of $\geq$ 50%. The benefit of lanadelumab was optimal during steady state. Lanadelumab was generally safe and well tolerated.
**Acknowledgements:** Presented on behalf of the HELP Study investigators.

## A67

### Maternal report of in-home occurrence of environmental exposures during pregnancy and allergic outcomes of their children at 2 years of age

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**Background:** Previous work has indicated that maternal environmental exposures during pregnancy can influence allergic disease progression in her offspring. Some exposures may be protective or harmful. Although these exposures rarely occur in singularity, the combined effect of multiple exposures on allergy remains unclear. We investigated maternal prenatal exposure to seven factors and determined their influence on allergy in the children at 2 years of age.
**Methods:** Prior to delivery, consenting pregnant women ($n = 92$) completed a survey regarding their home environment during pregnancy. Data on the presence of dogs, cats, mold, carpets, air fresheners, candles/incense, and cigarette smoke during pregnancy was captured for each participant. Children completed allergy testing at 2 years of age via skin prick testing (SPT). Mother's allergic status was determined at least 6 months post-delivery. Statistical analysis was performed using GraphPad Prism 7.
**Results:** 74 children had a negative SPT and 18 had a positive SPT at 2 years of age. All prenatal exposures except for carpet increased the odds ratio (OR) of a child's positive SPT; however, candles/incense was the only exposure that was statistically significant (OR: 5.1, 95% confidence interval 1.7–13.9 $p = 0.006$). The median total number of exposures for children with a positive SPT was greater when compared to their negative SPT counterparts (4 vs 2 $p = 0.005$). All children with 0 or 1 exposure had a negative SPT and as the total number of exposures increased, the percentage of SPT positive and SPT negative children increased and decreased respectively ($p < 0.001$).
**Conclusion:** We have provided additional evidence supporting the influence of prenatal exposures on childhood allergy. The relationship between increasing total exposure number and increasing percentages of positive SPT is important as it suggests that the combined effects of multiple exposures may be more influential on allergy development than one single exposure.

## A68

### Triggers, pharmacologic treatments, and complementary-alternative medicine use in patients with chronic urticaria

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**Background:** The natural history of chronic urticaria is limited, especially in the Canadian context. The purpose of this study is to determine the triggers and various treatments adopted by patients—including complementary/alternative medicine (CAM) and acute emergency services—from a single center in Vancouver, BC.
**Methods:** This is a prospective cross-sectional, single centered study in Canada, which involved a review of participant's medical records and a participant survey to evaluate basic demographics, triggers, and therapies used by individuals with chronic urticaria.
**Results:** 72 participants completed the survey with 59 females (82%). Patient ethnicities included 39 Caucasians (54%), 25 Asians (35%), 5 Middle Easterners (7%), 1 Hispanic (1%), and 2 First Nations (3%). The mean age of onset was $43 \pm 17$ years old. Patient perceived triggers included scratching 47%, stress 38%, heat 35%, cold 14%, food 11%, NSAIDS 11%, exercise 10%, alcohol 7%, and sunlight 3%. Sleep was affected in 75%. Treatments used and patient reported benefit (in parentheses) included first generation antihistamines 76% (78%), second generation antihistamines 97% (81%), prednisone 39% (75%), omalizumab 21% (73%), cyclosporine 4% (100%), montelukast 3% (0%), IVIG 1% (0%), methotrexate 1% (100%), naturopathy 21% (27%), acupuncture 7% (20%), and traditional Chinese medicine 3% (28%). Emergency department visits were reported by 43% of the participants.
**Conclusions:** This study observed a higher than expected proportion of females compared to males. Evidenced-based therapies such as omalizumab and cyclosporine may need more knowledge translation while unproven CAM therapies should be discouraged. Better understanding of the natural history, treatments, and outcomes in chronic urticaria will allow physicians to better inform patients and reduce emergency department visits.

## A69

### Assessing risk factors associated with a positive graded oral challenge (GOC) in children with suspected amoxicillin allergy

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**Background:** The diagnosis of amoxicillin hypersensitivity is challenging in children given that the sensitivity of commercially available skin tests