



INTRODUCTION

Approximately **20%** of individuals with **seasonal pollen-related allergic rhinitis** also experience **asthma symptoms** upon allergen exposure.

Sensitized individuals' exposure to allergens triggers **mast cell (MC) activation**, releasing substances causing airway hyperreactivity and mucus secretion, **exacerbating asthma symptoms**. These MCs **originate from circulating peripheral blood mast cell progenitors** (MCps).

In 2016, we established a link between rare circulating MCps and reduced lung function in asthmatic patients, but a **correlation between MCp frequency and asthma symptoms/severity remained to be elucidated**.

We aimed to **investigate if MCp frequency correlates with allergen exposure in allergic asthma patients**, assessing levels during pollen season when symptoms intensify, and outside pollen season.



INNOVATION
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CIRCULATING MAST CELL PROGENITORS INCREASE DURING NATURAL BIRCH POLLEN EXPOSURE IN ALLERGIC ASTHMA PATIENTS

AUTHORS: P. Abigail Alvarado-Vazquez¹, Erika Mendez-Enriquez¹, Maya Salomonsson¹, Ida Waern², Christer Janson³, Sara Wernersson², Andrei Malinovschi³, **Jenny Hallgren¹**



UPPSALA
UNIVERSITET

METHODS



Adult asthma patients exhibiting symptoms related to **birch pollen** were recruited, with data collected from **blood samples** both **during the birch pollen season** (mainly May) **and outside of the season** (November–January) across the years **2018, 2019, 2021, and 2022**.

Spirometry measurements, **asthma and allergy-related symptoms**, asthma control questionnaire (ACQ), and asthma control test (ACT) scores were assessed at both time points.

The MCp frequency was determined by **flow cytometry** in ficoll-separated blood samples from patients with positive birch pollen-specific IgE ($> 0.35 \text{ kU}_A/\text{L}$), and analyzed in relation to basic and disease parameters.



RESULTS

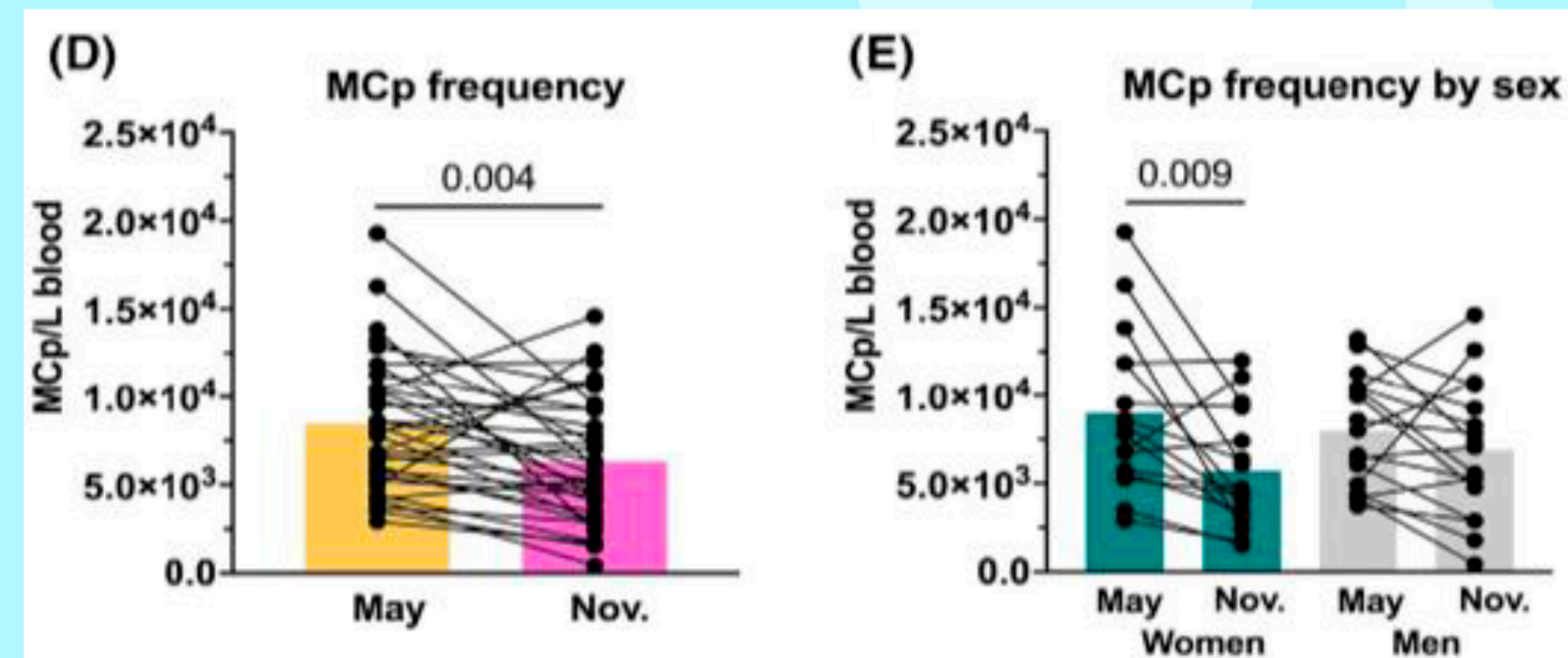
PARTICIPATION

The research participants consisted of **33 adult patients with asthma diagnosis**.

LINK BETWEEN SEASON AND MCP FREQUENCY

The **frequency of MCps** per liter of blood was **higher in May than in November** ($p = .004$), **particularly in women** ($p = .009$) (**Fig. 1**).

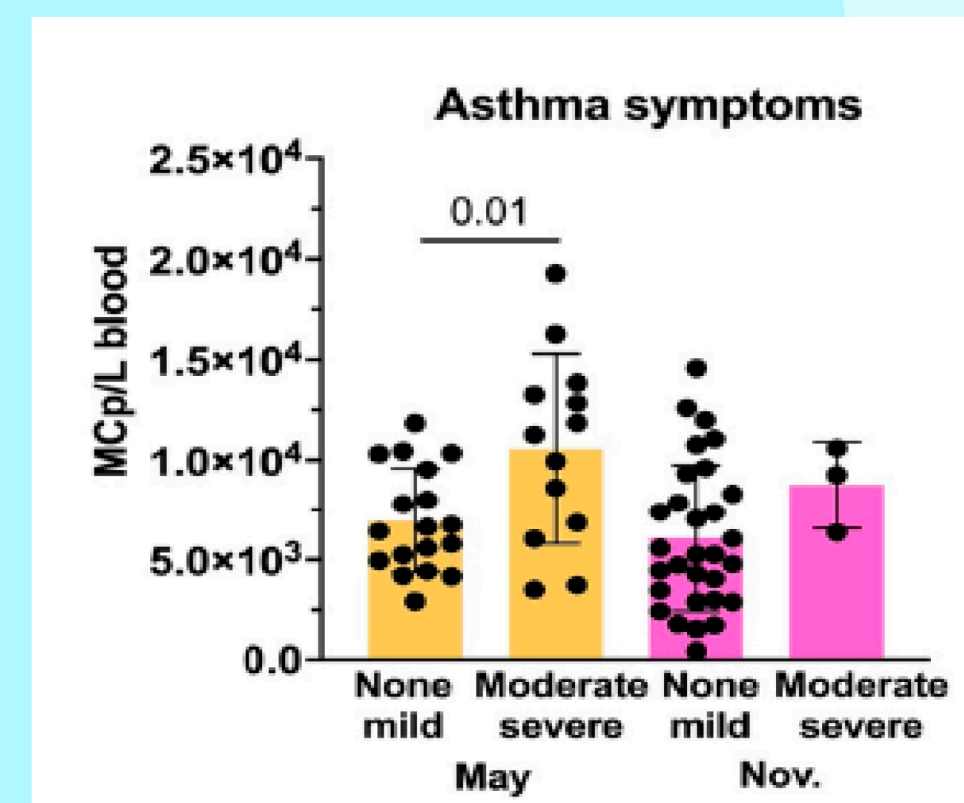
Figure 1. (D) The frequency of circulating MCps in May and November. (E) Comparison of the MCp frequency in women and men during May and November.



LINK BETWEEN ASTHMA SYMPTOMS AND MCP FREQUENCY

Patients that reported **moderate to severe asthma symptoms** ($< .01$) (**Fig. 2**), **nose or eye symptoms** ($p = .02$; $p = .01$), had **higher MCp frequency** in May than those that did not report this.

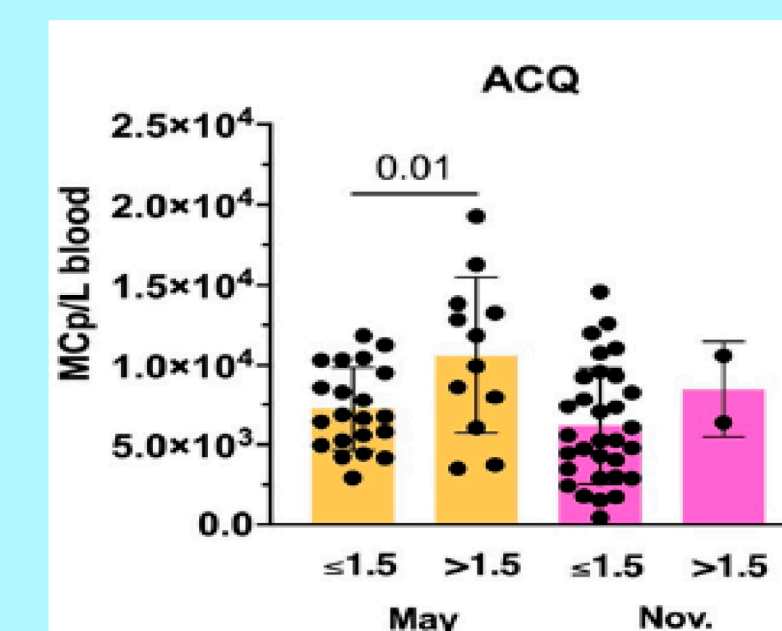
Figure 2. MCp frequency in patients that report none/mild, or moderate/severe asthma symptoms during May and November.



LINK BETWEEN MCP FREQUENCY AND ACQ & ACT

The **MCp frequency is higher** in patients with **reduced asthma control** (ACQ) in **May** ($p = .01$) (**Fig. 3**). The **change in asthma control to a lower ACT score** was correlated with an **increase in MCp frequency in May** ($p = .006$, $\rho = 0.46$).

Figure 3. MCp frequency in patients that reported reduced (> 1.5) or better (≤ 1.5) asthma control in May (yellow) and November (pink).



CONCLUSION



This work allowed to highlight that

the **MCp frequency is higher in patients with allergic asthma** that have reduced asthma control, and moderate to severe asthma and allergy symptoms during the birch pollen season.

We speculate that in symptomatic patients, **allergen exposure impacts the bone marrow to produce more MCps**, which during active recruitment to the airways, leads to a **transient increase of MCps in the bloodstream**.

Out of season, the allergen exposure is not present anymore, and thus the **MCp frequency in the blood declines**.

These findings might also suggest that **MCs accumulate in the airways in connection with symptom onset** during natural allergen exposure.

Understanding the relationships between cellular components and clinical symptoms is crucial to improve therapeutic approaches aimed at controlling asthma.

#POLLEN
#ASTHMA
#MASTCELL

Affiliations: 1. Department of Medical Biochemistry and Microbiology, Uppsala University, Uppsala, Sweden, 2. Department of Anatomy, Physiology and Biochemistry, Swedish University of Agricultural Sciences, Uppsala, Sweden, 3. Department of Medical Sciences, Uppsala University, Uppsala, Sweden

STALLERGENES GREER
Foundation