**EAACI Fellowship Final Report**

**Project Title:** Correlation between Basophil Activation Test and Mast Cell Activation Test in patients with Chronic Spontaneous Urticaria and Mast-cell Mediated Angioedema

**Name and Country:** Marta Planas Vinós, Spain

**Type, Duration and Location of Fellowship:** EAACI Clinical Fellowship, 3 months (February–April 2025), Berlin, Germany

**Host Institution and Supervisor:** Institut für Allergologie, Campus Benjamin Franklin, Charité – Universitätsmedizin, Berlin. Supervisor: Prof. Dr. Pavel Kolkhir.

**Project Summary**

During these 3 months, I had the unique opportunity to combine clinical training with active participation in a research project during my stay at the Institute for Allergology at Charité – Universitätsmedizin Berlin. This dual approach allowed me to broaden my understanding of chronic spontaneous urticaria and mast cell-mediated angioedema from both clinical and translational perspectives. During the first month, my primary focus was on patient care and observation in a specialized outpatient setting. For the last two months, I was also involved in a laboratory-based project evaluating the correlation between the Basophil Activation Test (BAT) and the Mast Cell Activation Test (MAT). This enriching experience provided me with valuable insights into the diagnostic and pathophysiological aspects of mast cell-driven diseases.

In the following section, I will describe the clinical aspects of my fellowship, including patient exposure, hands-on activities, and the settings in which I was involved.

- **Approximate number of patients observed:**

During my clinical fellowship, I observed and followed approximately 100-150 patients with chronic spontaneous urticaria (CSU), mast cell-mediated angioedema (AE-MC), and other allergic or mast cell-related disorders. Consultation hours were Monday to Friday from 8-12pm and from 13-16pm, and every day I could learn from a different doctor.

- **Tasks personally developed vs. activities only observed:**

I was actively involved in participation in multidisciplinary case discussions and collaborative decision-making, preparation of clinical case presentations and literature reviews and communication with patients in German (B1 level), enhancing both my clinical and language skills.

I observed allergy testing procedures (such as skin prick and intradermal testing), biologic therapy administration (immunotherapy and omalizumab administration) and clinical evaluations of CSU and AE-MC patients (including detailed anamnesis and follow-up).

- **Time distribution per department:**

The activities took place in the following settings at the Institute for Allergology, Charité – Universitätsmedizin Berlin:

  - Allergy outpatient clinic (Haus II).
  - Clinical immunology and flow cytometry lab, where we performed Basophil Activation Test (BAT) and Mast Cell Activation Test (MAT).

- Clinical research meetings (Wednesdays at noon) focusing on translational and patient-centred studies.
- Basic science meetings (Thursdays morning) discussing ongoing experimental research.

On average, I spent:

- 25-30 hours/week in the outpatient clinic during the first month.
- 35 hours/week in the lab, performing BAT and MAT and afterwards data analysis, during the second and third month.
- 2-4 hours/week attending academic and research meetings, including clinical and basic science seminars.

The next section outlines the research project I contributed to during the fellowship, detailing its objectives, methodology, and main outcomes.

**1. What questions were addressed and why?**

This research aimed to explore the correlation between the Basophil Activation Test (BAT) and the Mast Cell Activation Test (MAT) in patients with chronic spontaneous urticaria (CSU) and mast cell-mediated angioedema (AE-MC). The goal was to assess whether MAT provides complementary or superior diagnostic information compared to BAT, potentially improving the phenotyping and management of these patients.

Understanding the degree of correlation between BAT and MAT is essential, as both tests reflect different aspects of immune activation, and their combined use may enhance diagnostic precision in allergic and autoimmune urticaria.

**2. What was the nature of the research?**

The project was laboratory-based and involved:

- Isolation of peripheral blood mononuclear cells and mast cells.
- Performance of BAT and MAT assays.
- Quantitative analysis of activation markers (CD63, CD203c, FcεRI, etc.) using flow cytometry.
- Analysis of the data obtained using FlowJo (flow cytometry data analysis software).
- Statistical analysis to determine the correlation between results obtained from both tests using GraphPad.

The work was carried out in the research laboratories of the Institute for Allergology, using established protocols and flow cytometry equipment.

**3. What was the result?**

A total of 132 BATs and 238 MATs were performed. Among these, 67 and 75 samples were analysed in parallel to compare BAT and MAT results.

- In the 67-sample cohort, a moderate correlation was found (Spearman $r \sim 0.43–0.49$; $p < 0.001$).
- In the 75-sample cohort, a stronger correlation was observed ($r \sim 0.65$; $p < 0.0001$).

The research project is still ongoing, and we are currently conducting additional subgroup statistical analyses. However, the preliminary results of these two cohorts indicate that BAT and MAT are correlated, and that MAT may identify reactive profiles missed by BAT, suggesting a complementary role.

**4. How will the findings impact future research?**

These findings support the use of MAT as a complementary diagnostic tool to BAT, especially in patients with suspected autoimmune urticaria. The study provides preliminary data for the development of more personalized diagnostic algorithms and may guide future work on establishing clinical thresholds for MAT. Further research will aim to validate these results in larger cohorts and could assess the predictive value of MAT for treatment response, particularly to omalizumab or other biologics.

A draft manuscript titled *"Correlation between BAT and MAT in CSU and AE-MC patients"* is currently being prepared. EAACI will be acknowledged in all future publications and presentations related to this project.

**Conclusion and Personal Reflection**

Although I was initially awarded a Clinical Fellowship, the scope of my experience was expanded to include a research component, as agreed upon with my host supervisor. This adaptation was made possible thanks to the highly collaborative environment at the Institute for Allergology, where clinical care and translational research are closely integrated.

This fellowship has been a unique opportunity to grow both scientifically and personally. I have deepened my clinical knowledge in the management of urticaria and mast cell-mediated disorders, while also acquiring practical skills in advanced diagnostic techniques such as BAT and MAT. Combining both clinical work with laboratory practice has allowed me to broaden the understanding of functional diagnostic assays and their clinical relevance in allergy and immunology. Moreover, I have grown more confident in working in an international environment, and my ability to communicate with patients in German improved significantly over the course of the fellowship.

I would like to sincerely thank Prof. Pavel Kolkhir and all the physicians from the Sprechstunde — Prof. Dr. med. Markus Magerl, PD Dr. med. Thomas Buttgereit, PD Dr. med. Hanna Bonnekoh, PD Dr. med. Manuel Fernandes Lobo Pereira, Dr. med. Lea Kiefer, Dr. rer. nat. Melba Muñoz Roldán, and Carolina Vera Ayala — for their mentorship and for allowing me to be part of their team at the Institute for Allergology.

I am especially grateful to Dr. Stefan Frischbutter, Head of Basic Research, for his guidance and teaching throughout my time in the laboratory. Thanks to his support, I was able to significantly improve my technical skills in cell isolation, flow cytometry, and data analysis, and gain a deeper understanding of experimental design in immunological research.

I am also deeply grateful to all the researchers, clinicians, and staff members for their patience, guidance, and support throughout my stay. A special thanks to Alba, a biotechnology student, for working side by side with me every day in the lab.

Finally, I would like to thank the EAACI for making this enriching opportunity possible through the Clinical Fellowship programme. This fellowship has strengthened my motivation to pursue a career that bridges clinical care and research in allergic diseases.