

EAACI 2022



Review of the European Academy of Allergy and Clinical Immunology (EAACI) Congress 2022

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FOLLOWING the success of the hybrid format at the 2021 European Academy of Allergy and Clinical Immunology (EAACI) congress, it was decided that this year's annual meeting would be held online, as well as in the remarkable city of Prague, Czechia. With 8,000 participants from 120 countries participating in EAACI 2021, Marek Jutel, EAACI President, and Petr Panzner, EAACI Hybrid Congress Chair 2022 both emphasised the benefits of this flexible format, expanding interaction with experts across the globe and improving the outreach of the impressive scientific programme that was on offer at this year's event. EAACI have focused on the development of their Digital Congress Platform, providing a seamless transition between the physical and virtual elements of the meeting.

This year's motto was centred around the One Health approach, which concentrates on establishing the intrinsic links between human health and environmental factors. The innovative approach is the research focus of the EAACI academy, and has gained impetus within the European Commission and World Health Organization (WHO). This has led to new perspectives towards providing solutions to disease transmission and treatment. With the development of

various multidisciplinary relationships and initiatives in One Health research, expertise from the perspective of allergy and immunology community was shared throughout EAACI 2022, alongside opportunities for further discussion of this exciting concept.

Over the 3-day event, EAACI had a range of scientific sessions, to attend both in-person and online. Featuring journal highlights from EAACI, hot topic sessions covering late-breaking discoveries in the field, and hybrid interactive workshops which allowed speakers to discuss clinical and translational evidence interactively. Spanning across the discipline, presentations covered fascinating topics including the novel avenues of immunology in the post-COVID era, emerging treatments for relevant conditions including angioedema, and the evolving epidemiology and understanding of food allergies.

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A new addition to this year's congress were the ePosters available on the EAACI Digital Congress Platform. With sustainability and outreach in mind, the publishing of these posters online allowed maximum exposure of fascinating research from over 1,700 delegates. Covering topics including the management of allergic rhinitis, adverse reactions to insect venom, and the impact of gut microbiome maturation on food allergy, these ePosters were an interactive and modern way to share late-breaking findings across the discipline.

An awards ceremony also took place at this year's EAACI congress. The PhARF award was presented to Maria M Escribese, Associate Professor and Vice Dean of Research and Postgraduate Studies, Basic Medical Sciences Department, Universidad San Pablo CEU, Spain. This award recognises young investigators for their outstanding contributions to research, and also offers a research grant, which can fund several projects. The Allergopharma award was also handed out this year. Established in 2000, this award recognises scientific achievement of young scientists in allergy and immunology, and encourage further research. This year, Janice Layhadi, Research Associate, Imperial College London, was given the Allergopharma award for her project entitled 'Precision Immunology and Biomarkers of Allergy and Immunotherapy'. Being the research lead for single-cell multi-omic research, which has resulted in the identification of novel biomarkers, Layhadi's research

has prompted several peer-reviewed publications in high-impact journals.

Our independent review of this event gives a comprehensive oversight of the highest quality research on offer at EAACI 2022. The authors of selected standout ePosters have provided key summaries of their research, which are shared in this issue. Covering topics including the management of angioedema, injection-site reactions following the COVID-19 mRNA vaccine, and the prescription of epinephrine auto-injectors, these summaries give fascinating insights into the latest research in the field. An in-house feature on the topic of environmental science in allergy and asthma is also included, giving an overview of current guidelines and sharing perspectives on the One Health approach.

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Read on for our key insights into the congress, sharing the aforementioned content alongside selected late-breaking news stories. We were delighted to attend this event in-person following the restrictions of the pandemic, and hope to join the allergy and immunology community once again in Hamburg, Germany for EAACI 2023. ●



How Blue and Green Spaced Can Impact Asthma and Allergic Disease Incidence

DEVELOPING EVIDENCE was presented at the Annual Congress 2022 of the European Academy of Allergy and Clinical Immunology on the impact of growing urbanisation, exposure to air pollution, and the loss of natural environments on disease patterns and prevalence. Non-communicable diseases, such as asthma and allergic diseases were highlighted as particularly impacted by the changing relationship between humans and their surrounding environment.

Previous studies have investigated how the loss of natural spaces and biodiversity can impact dysbiosis of the human microbiota. The holobiont concept underlines the importance of environmental context in the dynamic interaction between humans and their microbiota. The inconsistent evidence produced by previous studies researching the impact of green and blue spaces on development of allergic disease and asthma may be due to variety in geographic location, definition of outcome, and conceptualization of green and blue spaces. However, recent studies have demonstrated that exposure to green spaces at specific points throughout life can be key to protection against allergy and asthma.

In addition, some evidence has suggested that schools and residential neighbourhoods with high exposure to green spaces have a dose-response relationship with lower prevalence of asthma and allergic symptoms. Furthermore, blue spaces have been associated with improvements in human health through lowered environmental hazards and increased physical activity.

“Most of the studies provide evidence that natural spaces and biodiversity may be a protective factor for the development of allergy and asthma, showing that integrating natural elements into cities in a



controlled way and promoting the contact of humans with nature may be an effective strategy to promote human health as well as prevent allergic and respiratory diseases,” explained Inês Paciência, Center for Environmental and Respiratory Health Research, Oulu, Finland.

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Though multiple associations have been drawn between environmental influences and allergic disease occurrence no conclusive mechanisms have been articulated. However, several mechanisms have been suggested to potentially explain these effects. These include exposure to air pollution, pollen concentration, the impact of the autonomic nervous system, and immunological responses to the environment. However, further future study is needed to increase understanding of the relationship and the driving mechanisms. ●

Does Sex Affect Disease Severity in Atopic Dermatitis?



"Whilst symptoms were objectively more severe in males, no sex differences in subjective experience and impact on quality of life were identified."



FINDINGS presented at the EAACI Hybrid Congress, Prague, Czechia, 1st–3rd July 2022, by lead author Katharina Zeiser, University of Augsburg, Germany; CK-CARE, Christine Kühne-Center for Allergy Research and Education (CK-CARE), Davos Wolfgang, Switzerland, highlights differences in symptom severity between male and female patients with atopic dermatitis.

Atopic dermatitis is an inflammatory skin condition that has a prevalence of 5–15% in Europe. It causes symptoms such as dry, itchy skin, and sleep disturbance, which have a negative impact on patient quality of life.

Zeiser and colleagues analysed cross-sectional data from 1,011 patients included in the prospective, multicentre, longitudinal, atopic disease study, ProRaD, between 2016 and 2021, in order to determine whether an association between disease severity and sex exists. Of these 1,011 patients, 57% were female, 43% were male, and median age was 39.5 years.

Symptom severity was measured using the affected body surface area, SCORing Atopic Dermatitis (SCORAD), and Eczema Area and Severity Index (EASI) objective symptom measures.

The results showed that objectively, males experienced more severe symptoms than females. These differences were not dependent on age or treatment. No sex differences were found in relation to subjective, patient-reported measurement of symptoms or quality of life. Higher symptom severity was found to be associated with treatment use and lower educational levels in both sexes.

In summary, whilst symptoms were objectively more severe in males, no sex differences in subjective experience and impact on quality of life were identified. The researchers state that further data analysis is required to improve understanding of the biological, psychosocial, and microbiological factors involved in development of atopic dermatitis in both specific patient groups and individuals. This in turn, could lead to development of personalised treatment pathways and help to facilitate improved prevention strategies. Currently, work by the ProRaD team in Bonn on analysis of a sex-specific biomarker is underway in order to achieve a deeper understanding of these findings. ●



Farm Environments Protect Children from Allergies

RESEARCH HAS found that children who grow up in a farm environment have significant protection from both allergies and asthma. Living on a cattle farm, and consuming raw cow's milk, has been proven to be beneficial.

Presented at the EAACI Annual Congress 2022, in Prague, Czechia, one study reported that a bovine factor specific to different bovine species is involved. Researchers collected dust specimens from several cattle stables. When these samples were evaluated, one predominant protein was discovered, and confirmed as β -lactoglobulin (BLG), the source of which is cattle urine. This major whey protein was also found in dust in the households of the respective cattle farms.

Data suggest that β -lactoglobulin is a bovine-specific acute phase protein, which is associated with the immune regulation aspect of inflammation. In *in vitro* examination, empty BLG was used in healthy donors for the stimulation of peripheral blood mononuclear cells. Researchers found that the proliferation rate was higher, and that a Th2-dominated milieu commenced. When investigators attached zinc to BLG, CD4+ and CD8+ cells were found to be inhibited, which is linked to a Th1-dominated cytokine profile.

In vivo examination went on to prove the anti-allergic properties of BLG-zinc. Investigators treated mice intranasally with stable dust from the initial samples, some of which contained BLG, and some of which did not. In subsequent allergen and sensitisation tests, mice were found to have reduced allergic symptoms.

“The type of soil for planting animal feed, the biodiversity of feeding plants and stable environment, the type of feed for the animals and milk processing potentially influence the structure and loading of this protein.”

Isabella Pali-Schöll, Nutritional Scientist at the Department for Comparative Medicine, Messerli Research Institute, Meduni and VetMedUni Vienna, declared: “Our study demonstrates for the first time that an innate immunoregulatory protein, namely β -lactoglobulin, is a novel player in the protective farm effect.” She went on: “The type of soil for planting animal feed, the biodiversity of feeding plants and stable environment, the type of feed for the animals and milk processing potentially influence the structure and loading of this protein.” ●

Could Platelet Profiles Provide Potential Therapeutic Targets for Personalised Allergy Therapy?

ANALYSIS of platelets from those with severe respiratory allergies has revealed differences in lipid, protein, and mRNA content when compared to platelets from those with milder or no allergy phenotypes.

Lead researcher, Elena Izquierdo, Institute of Applied Molecular Medicine Nemesio Díez, Department of Basic Medical Sciences, Faculty of Medicine, San Pablo CEU University, Madrid, Spain, presented these findings at the EAACI Hybrid Congress, Prague, Czechia, on 3rd July 2022.

Izquierdo and colleagues have previously shown that platelet function is altered in those with severe respiratory allergy phenotypes compared to those with mild/no allergy phenotypes. Since then, they have conducted further research into the differences in platelet content profiles between those with severe and mild/no allergy phenotypes.

Platelet-apheresis and lipid extraction techniques were used to analyse the total lipid and mRNA content of platelets from 26 patients with varying allergy phenotypes in order to assess the role that platelets play in severe allergy. Of the 26 patients enrolled, seven displayed a severe allergy phenotype, nine displayed a mild allergy phenotype, and 10 had a non-allergic phenotype.

Platelets from the seven patients with severe respiratory allergies displayed higher levels of ceramide, phosphatidylinositol, phosphatidylcholine, and sphingomyelin pro-inflammatory lipids, mRNA transcripts, and P-Selectin and IL-17AF proteins when compared to the platelets of those with mild or no respiratory allergy phenotypes.

Given the rising annual incidence of respiratory allergies and the complications associated with them, this research could inspire further research to improve identification and management of severe respiratory allergies.

Izquierdo stated that the results help to "identify novel biomarkers essential for the stratification of patients and to provide novel therapeutic targets for personalised interventions that could prevent the evolution of inflammation to a chronic state."

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The study findings could provide potential targets for novel therapeutics, as well as potentially identify biomarkers indicative of severe allergy. Further research in these areas could lead to reduced disease burden, improved quality of life for patients with severe respiratory allergies, and ultimately, healthcare costs. ●



Validation for Artificial Intelligence in Provocation Tests

ALLERGY is an increasing threat to global health, and affects 20% of Europeans. Y. Yarin and colleagues from the ENT and Allergy Center in Dresden, Germany, and Y. Kalaidzidis, an expert in image analysis, have designed an artificial intelligence (AI)-based method of quantitatively evaluating allergic reactions in conjunctival provocation tests (CPT).

While the threat of allergy is increasing, so is the number of patients who are poly-allergic, resulting in the diagnostics of allergic traits to become more complex. CPTs are widely used due to their clinical evidence, specificity, and sensitivity. However, there is an absence of objective quantitative measurements, which is a huge setback for its use in routine clinical practices. Previous efforts to create a reproducible quantification method for CPTs had never gone beyond research projects and clinical studies due to its complex nature and the amount of labour needed.

However, the progress made in AI, particularly in deep neural networks, provides an opportunity for CPTs to become automatic. AllergoEye, designed by Yarin and colleagues, is an AI-based method that was validated by an open-labelled, prospective, monocentric study of 41 patients, who

were exposed to different dilutions of grass allergens. A smartphone camera was used to screen and get images of the patients' eyes. This information was then transferred for quantification and image analysis on a computer. The reactions were then analysed by the medical team, subjectively or qualitatively, and AllergoEye quantitatively measured the results.

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AllergoEye demonstrated high sensitivity and specificity (98% and 90%, respectively) compared with human estimates; however, tuning the AllergoEye cut-off thresholds significantly increased the specificity (to approximately 97%), highlighting a correlation between patient sensitivity and their sIgE capacity classes, and indicates how they are obvious to see, which was not the case in the subjective and qualitative system scores. Yarin believes that "it could be used for patient selection and controlling the treatment efficiency in clinical studies, as well as for diagnostic and therapy control in routine allergologists' practice." ●

Lack of Understanding Amongst Physicians in the Diagnosis and Treatment of Anaphylaxis

ANAPHYLAXIS is an acute systemic hypersensitivity reaction, with potentially life-threatening outcomes. The variety of clinical symptoms that can be associated with anaphylaxis make it challenging to diagnose, often resulting in a late diagnosis or undetected occurrence. Late diagnosis can have catastrophic consequences; therefore, it is essential that occurrence of anaphylaxis is caught early, and correct treatment options are given. Late-breaking research presented at the European Academy of Allergy and Clinical Immunology (EAACI) 2022 Congress highlighted the insufficient understanding of this reaction by healthcare professionals.

Researchers from the Clinic of Chest Diseases, University of Health Sciences, Derince Training and Research Hospital, Kocaeli, Turkey, carried out a survey with the aim to evaluate 840 physicians' awareness and knowledge of the diagnosis and treatment of anaphylaxis. Of the participants, 42.0% were specialists, 29.9% were general practitioners, and 28.6% were residents. The physicians were asked to identify anaphylaxis symptoms, and results showed that 90% identified skin involvement, 84% respiratory involvement, and 78% identified involvement of the cardiovascular system. Less than 50% of participants associated gastrointestinal and upper respiratory tract involvement with anaphylaxis symptoms.

The main treatment option for anaphylaxis is currently adrenaline. During the questionnaire, 83.3% of participants chose this option, with 69.6% recognising the correct route of administration, and 76.4% the application site for adrenaline. Sixty-one per cent of physicians accurately identified the dose of adrenaline therapy, and 48.7% stated that there

was no absolute contraindication for the use of adrenaline. Resident physicians had the highest rate of accurate answers regarding dosage and administration, perhaps reflecting the specific education provided during residency. Cihan Örçen, contributing study author, noted: "Anaphylaxis should be considered as a whole with correct diagnosis and correct treatment."

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Study observations highlighted the areas in which knowledge was lacking. The low identification of the upper respiratory and gastrointestinal tracts as symptoms for diagnosis could reflect the inadequate use of adrenaline. The results also emphasised the need for continued education to improve the widespread knowledge of healthcare professionals in the diagnosis and treatment of anaphylaxis. ●

