

Novel diagnostics and therapeutic approaches for allergic diseases

This month's editorial discusses three exciting studies that were selected by the Editors of the journal to be included in this issue. Firstly, this article describes a novel skin prick test appraisal framework established on a low cost, portable smartphone thermography device, Thermo-SPT, developed to help diagnose allergic rhinitis in patients.^{1,2} Allergic rhinitis (AR) is a chronic inflammatory condition of the nasal mucosa resulting from exposure to prevalent seasonal allergens such as grass, tree and weed pollen, and perennial allergens such as house dust mites and animal dander. There are 1 in 4 patients who suffer from AR, and the disease has a negative impact on their socio-economic status, as well as the quality of their lives.³ An accurate diagnosis of allergic rhinitis requires a

thorough medical history, a physical examination and identification of the sensitising allergen in vivo (skin prick test) and an in vitro test for specific IgE antibodies. It is noteworthy that SPT is the in vivo diagnostic test of choice in the allergy clinic due to its simplicity, reliability and cost-effectiveness.

This issue of Clinical & Experimental Allergy features the work of Goktas et al.⁴ The authors used an innovative digital approach and integrated infrared thermography (IRT) system with the standard SPT procedure to assess allergen-induced skin reactions at multiple time points, thereby enhancing the capabilities of the SPT in this regard. Using infrared radiation as a method of monitoring skin surface temperature in the human body, IRT can be considered

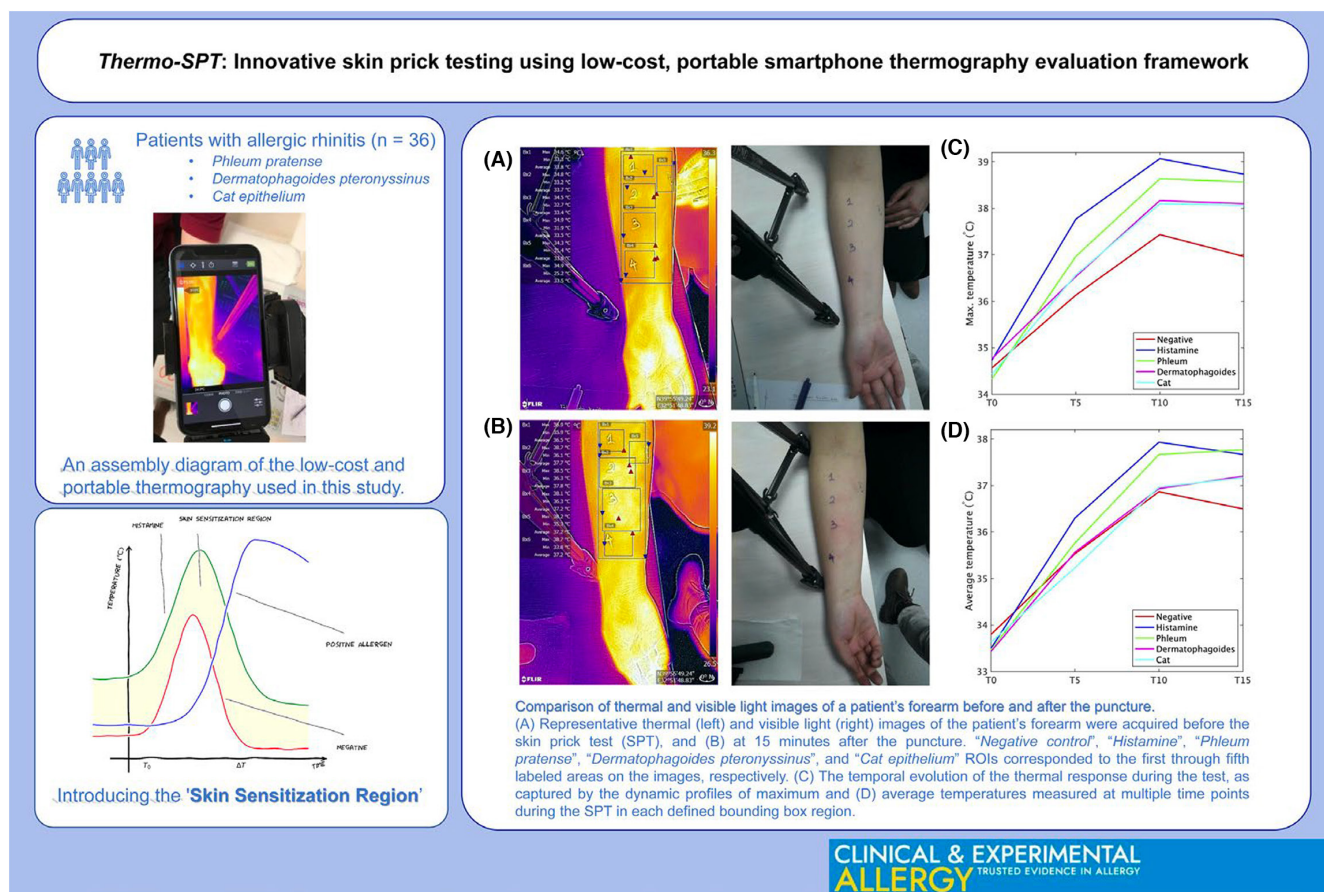


FIGURE 1 To improve the accuracy and reliability of skin prick test (SPT) outcomes, an innovative SPT evaluation framework using low-cost, portable smartphone thermography is presented. The proposed framework has the potential to effectively assess allergen-induced skin reactions at multiple time points during the SPT, as an alternative to the extensive manual interpretation experience as standard SPTs.

Ara h 2-specific IgE epitope-like peptides inhibit the binding of IgE to Ara h 2 and suppress IgE-dependent effector cell activation

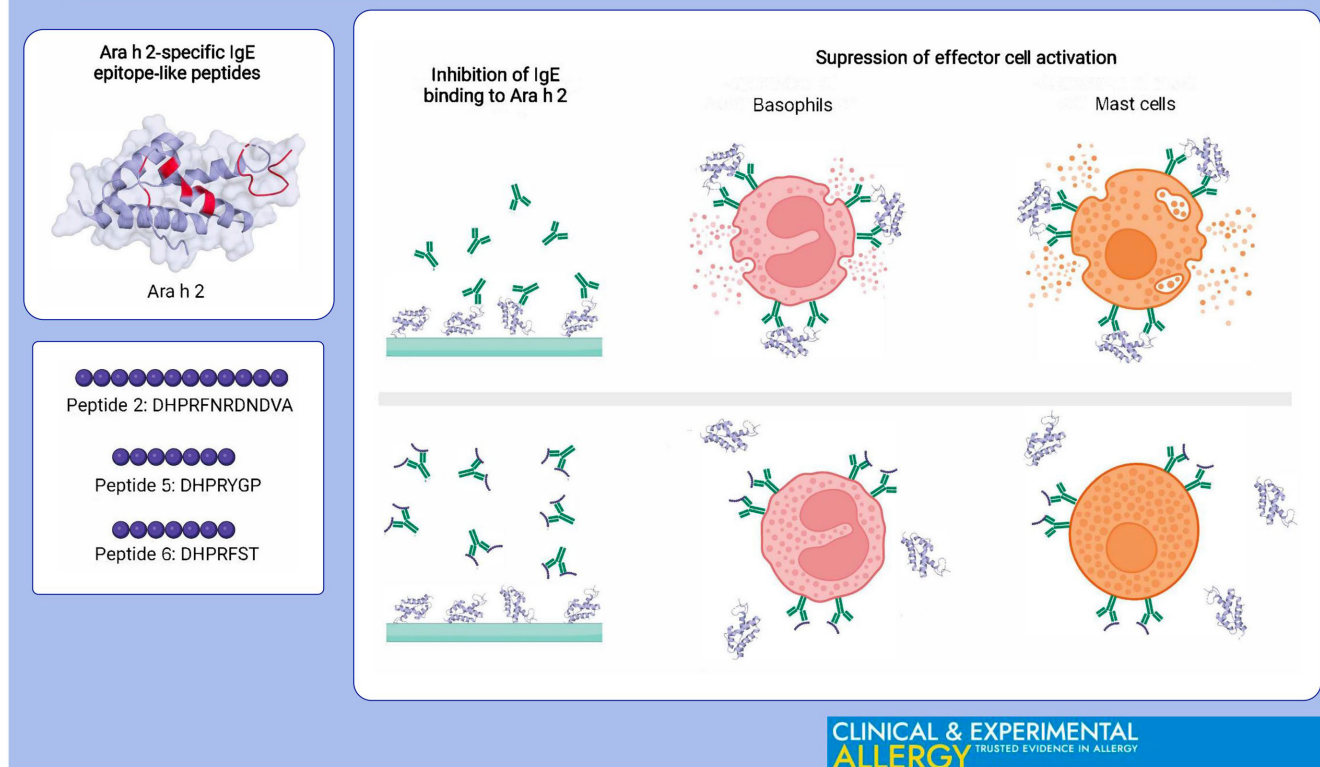


FIGURE 2 Ara h 2-specific IgE epitope-like peptides inhibit the binding of IgE to Ara h 2, reduce the allergenic activity of Ara h 2 and suppress IgE-dependent basophil and mast cell activation.

as a non-invasive, contactless method. Several experimental studies were conducted to evaluate the efficiency and applicability of IRT imaging as a method of increasing the repeatability and applicability of this technique in clinical settings by assessing its use. Using the temperature change distribution as a function of time, the authors evaluated the optimal reading time point formulation that discriminates the specific allergy sensitivity to aeroallergens based on the temperature changes over time. With the use of this proposed SPT evaluation framework that utilises a smartphone-based thermographic imaging technique that is low cost, the interpretability of allergic responses can be enhanced during the SPT, potentially reducing the need for extensive manual interpretation experience that is required in standard SPTs (Figure 1).

This issue's second editor's choice article explores the mechanisms through which specific peptides reduce the allergenic activity of Ara h 2 and suppress the IgE-dependent activation of basophils and mast cells. Based on the findings from these studies, epitope-paratope blocking may be an effective therapeutic strategy for food allergies. Moreover, there is only one fully approved oral immunotherapy (OIT) approach for treating peanut allergy.^{5,6} A further unmet need is to develop novel therapeutic approaches to prevent peanut sensitisation as a primary prevention strategy for food

allergies. Korosec et al.⁷ have identified and characterised unique Ara h 2 IgE epitope-like peptides and found that these peptides block IgE binding to Ara h 2 and suppress Ara h 2-induced mast cell and basophil effector cell degranulation in individuals with peanut allergy. IgE epitope-like peptides specific for Ara h 2 inhibited IgE binding to Ara h 2, mast cell activation and basophil activation in response to peptides containing IgE epitopes (Figure 2).

In the final Editor's Choice article, the authors evaluated the clinical significance of serum Club cell 16-kDa secretory protein (CC16) levels in a real-world clinical environment of asthmatics who maintained their asthma medications.⁸ Moreover, the effect of oxidative/inflammatory responses on CC16 secretion from airway epithelial cells and the role of CC16 as a potential therapeutic target for adult asthmatic patients in vitro experiments were evaluated.⁹ The study findings revealed attenuated levels of serum CC16 in adult asthmatics having bronchodilator responsiveness even on anti-asthmatic medications. A positive correlation was observed between serum CC16 and FEV1%. Finally, CC16 downregulation induced oxidant/antioxidant disequilibrium in asthmatic airways, contributing to airway inflammation and remodelling. The three articles above highlight novel advances in novel diagnostics and therapeutics for allergic diseases (Figure 3).

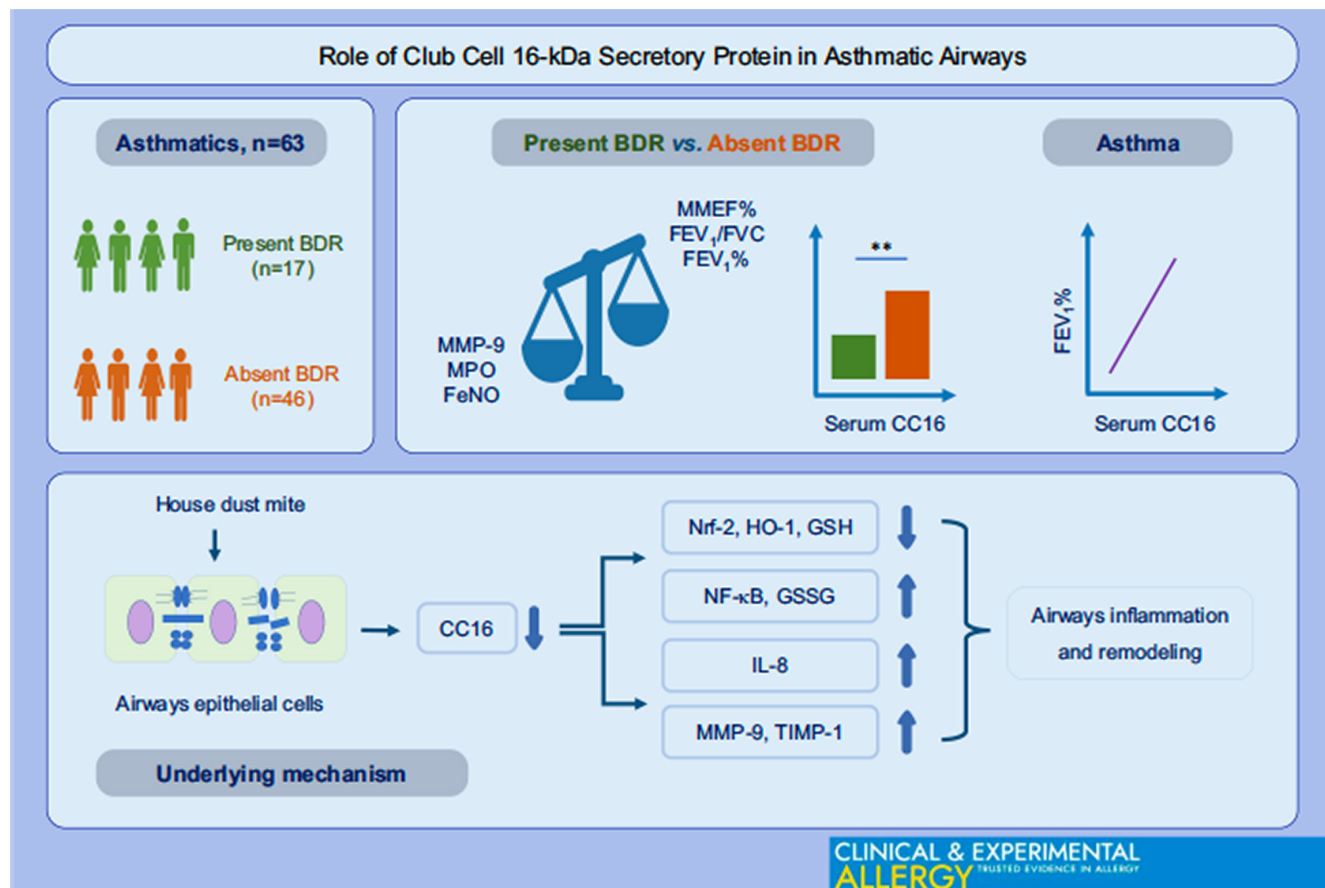


FIGURE 3 Asthmatics in the present bronchodilator responsiveness (BDR) group had greater levels of serum MMP-9/MPO and FeNO, and lower levels of serum CC16, MMEF% and FEV1% than those in the absent BDR group. FEV1% positively correlated with serum CC16 levels. CC16 downregulation in HDM-stimulated AECs was associated with an imbalance of oxidant (NF- κ B and SSG)/antioxidant (Nrf-2, HO-1 and GSH) systems and proinflammatory cytokine outputs (IL-8, MMP-9 and TIMP-1).

AUTHOR CONTRIBUTIONS

MHS drafted the manuscript. RJB approved the manuscript.

CONFLICT OF INTEREST STATEMENT

No conflict of interest for both authors.

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