Review article

Allergy to green peas: Clinical manifestations, diagnosis and pathogenesis

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ABSTRACT

The study aims to analyse the clinical manifestations and pathogenesis of green pea allergy, compare the effectiveness of modern methods of diagnosing this disease, and develop recommendations. The methodology included an assessment of the pathogenetic mechanisms of green pea allergy, an analysis of the main clinical manifestations of the disease, a comparison of the main diagnostic methods, and a synthesis of the data obtained into a single whole to describe the specifics of the disease. The study determined that the main allergens of green peas are Pis s 1 and Pis s 2 proteins, which belong to the family of storage proteins and demonstrate high immunogenicity and stability to heat treatment. These proteins were found to be the main factors of cross-reactivity with other legumes such as peanuts, chickpeas and lentils. Provocative tests demonstrated the highest sensitivity and specificity (100%) of all diagnostic methods, but due to the risk of anaphylaxis, their use is limited to specialised clinics. Molecular allergology has proven to be effective in identifying specific allergenic proteins and managing cross-sensitisation. Regional and social factors also influence the prevalence of green pea allergy, including dietary habits, urbanisation and environmental conditions. In the paediatric population, allergy most often manifests itself in the form of skin reactions and anaphylaxis, which emphasises the need for early diagnosis in this group. The study confirmed the need to introduce molecular allergology to improve diagnostic accuracy and personalised treatment of green pea allergy.

Keywords: anaphylaxis, immune response, legumes, proteins, cross-reactivity,

INTRODUCTION

The relevance of green pea allergy is driven by the rising global prevalence of food allergies and their significant impact on patients' quality of life. Green peas, as a common source of vegetable protein, pose a potential risk for hypersensitive individuals. Despite their nutritional benefits, limited understanding of the clinical manifestations and pathogenesis of green pea allergy complicates diagnosis and treatment, underscoring the need for further research. The increase in green pea allergy cases, particularly severe anaphylactic reactions, is concerning, especially as pea proteins are used in many processed foods (Oleksy-Gębczyk *et al.,* 2024; Parrinello *et al.,* 2024). The absence of a universal allergen labelling system exacerbates this issue (García-Juárez *et al.,* 2024). The prevalence of green pea allergy varies by region, with increasing plant-based protein consumption making it particularly relevant in Europe, North America, and Asia, where peas are common in vegetarian and vegan diets (Uazhanova *et al.,* 2018). This highlights the need for large-scale epidemiological studies. International organisations, such as the United Nations (UN) and European Union (EU) are working on strategies to address food allergies,

including green pea allergy, through standardised labelling, hypoallergenic food development, and public awareness (Branca, 2024). These initiatives aim to improve diagnosis, treatment, and food safety related to allergic diseases.

Current trends in allergy diagnostics include molecular allergology, which identifies specific allergenic proteins, and personalised treatment approaches (Byeon *et al.,* 2024). There is also increasing focus on new pharmacological strategies, such as monoclonal antibodies and immunotherapy, to modulate the immune response (Parrinello *et al.,* 2024). Research on legume allergies, particularly green peas, highlights several key areas. One focus is the molecular characteristics of allergens and their cross-reactivity across legumes. Taylor *et al.* (2021) analysed specific proteins in green peas, underscoring the importance of risk assessment for hypersensitive individuals. Similarly, Abu Risha *et al.* (2024) examined legume allergens, particularly pea, chickpea, and lupine, finding high cross-reactivity. Richard *et al.* (2015) explored the risks of Dun peas, which can cause anaphylaxis in children sensitised to legumes.

An important area of research is the epidemiology and prevention of legume allergies. Lisiecka (2024a) reviewed the epidemiology, prevention, and pathogenesis of these allergies, focusing on genetic and environmental factors. This aligns with Verma *et al*. (2013), who noted a global rise in legume allergies, particularly due to increased consumption, and recommended improvements in diagnostic and therapeutic approaches. Abi-Melhem and Hassoun (2023) highlighted the "hidden allergenicity" of peas, which leads to missed diagnoses and inadequate treatment, emphasising the need for better awareness among healthcare professionals. Additionally, studies on physical factors affecting allergenic properties of pulses are crucial. Sell *et al.* (2005) explored how the maturity of green peas influences allergenicity, impacting food safety. Research on cross-reactivity between peas and other foods, particularly peanuts, by Wensing *et al.* (2003) showed a correlation between pea sensitisation and IgE antibodies to the vicilin protein. Martínez San Ireneo *et al.* (2008) examined cross-reactivity among legumes in the Mediterranean population, noting variability based on local diets, which requires tailored diagnostic approaches. Popp *et al.* (2020) identified *Pisum sativum* (Pis s) 1 as the main allergen in green peas, with key immunoglobulin E (IgE) binding sites, providing valuable diagnostic information for detecting pea allergies in children.

Despite advances in the study of food allergies, allergy to green peas remains understudied. The lack of accurate epidemiological data, imperfect diagnostic methods and a lack of personalised approaches to therapy create a gap in understanding this pathology. The study aims to analyse current approaches to the diagnosis, treatment and study of the pathogenesis of green pea allergy with a focus on identifying key issues and prospects for further research.

MATERIALS AND METHODS

In this study, the method of analysis was used to systematise information and study the methods of diagnosis, pathogenesis of the disease and clinical manifestations of green pea allergy. The comparative analysis was used to compare different approaches to diagnosis (laryngoscopy, spirometry, skin tests, immunological tests), and identify their advantages, limitations and accuracy. Synthesis was used to combine the data obtained into a holistic picture, which was used to identify systemic relationships between clinical manifestations, diagnostic methods and pathogenesis of the disease.

The study uses data and recommendations from international organisations such as the UN and EU, as well as the World Health Organisation (Food and Agriculture, 2001) and the European Food Safety Authority, which define general approaches to the study of food allergies, including green pea allergy. Statistical data on the prevalence of legume allergy among different age and regional groups was

used (Lisiecka, 2024a; Verma *et al.*, 2013). The study included an analysis of the key allergens, namely Pis s 1 and *Arachis hypogaea* (Ara h) 1 (Popp *et al.*, 2020). The inclusion criteria for this study included peer-reviewed literature, clinical studies, and official guidelines that directly addressed the clinical symptoms, diagnosis, pathophysiology, or therapy of green pea allergy and related legume allergies. Exclusion criteria included non-scientific papers, opinion pieces with no empirical backing, and studies unrelated to green pea or legume allergies.

Deduction and induction methods were used to analyse the mechanisms of green pea allergy pathogenesis and to develop recommendations for improving diagnostic and treatment methods. The deduction method was used to draw general conclusions from already known facts, such as the principles of allergy pathogenesis, to develop current medical recommendations. Induction was used to create new approaches to studying the mechanisms of green pea allergy, as well as to improve treatment and diagnostic methods. Generalisation was to summarise the research results into common principles, and systematisation streamlined the knowledge gained, which became the basis for building a structured approach to understanding the problem.

RESULTS AND DISCUSSION

Clinical manifestations of green pea allergy

Clinical manifestations of green pea allergy vary based on individual characteristics, the method of allergen consumption, and the patient's age. Common symptoms include skin, respiratory, and gastrointestinal reactions, which may occur alone or together. These symptoms typically appear shortly after exposure but sometimes the onset may be delayed up to six hours (Mastrorilli *et al.*, 2024). In young children, skin symptoms like hives, itching, and eczema are most common, usually after consuming fresh or processed peas (Hartmane, 2024). More sensitive children may also experience generalised skin reactions with swelling, especially in the face and lips (Smits *et al.,* 2021). Gastrointestinal symptoms, such as nausea, abdominal pain, vomiting, and diarrhoea, are frequent in school-age children and may lead to dehydration in severe cases, requiring medical attention (Hildebrand *et al.,* 2021).

In adolescents and adults, respiratory symptoms, including rhinitis, sneezing, shortness of breath, and bronchospasm, become more prominent, often triggered by inhalation of pea particles during cooking. Some may also experience generalised weakness, headache, and dizziness due to systemic allergic reactions (Webber and England, 2010). Severe allergic reactions, such as anaphylaxis, are of particular concern. Although the frequency of such reactions is relatively low, they pose a serious threat to the patient's life. Anaphylaxis is usually accompanied by a sharp drop in blood pressure, difficulty breathing due to laryngeal oedema, generalised urticaria and loss of consciousness (Dashi *et al.,* 2015; Del Carpio-Delgado *et al.,* 2023). Patients with cross-allergy to other legumes, such as peanuts or lentils, are known to have a higher risk of anaphylaxis due to shared protein allergens (Mansoor and Sharma, 2011).

Cross-reactivity with other legumes, such as lentils or chickpeas, complicates diagnosis and can lead to oral allergy syndrome. Common proteins like vicilin (Pis s 1) cause similar reactions in individuals with peanut, chickpea, or lentil sensitivity, making allergen identification challenging and requiring more precise diagnostic methods (Martínez San Ireneo *et al.,* 2008). The form of green peas consumed also impacts symptom development. While heat treatment may reduce allergenicity, it can sometimes alter protein structure, increasing immunogenicity (Struminska *et al.,* 2014). Additionally, ready-to-eat pea products complicate identifying the source of allergic reactions (Smits *et al.,* 2021). Social and environmental factors also affect allergies. Regions with higher green pea consumption

report more allergic reactions, particularly in children and adolescents. Some studies suggest a link between environmental pollution levels and the severity of food allergy symptoms (Sharma *et al.,* 2015). Thus, clinical manifestations of green pea allergy vary from mild skin reactions to severe conditions like anaphylaxis. Effective treatment and prevention require individualised approaches, accurate diagnosis, and patient awareness of risks.

The pathogenesis of green pea allergy is driven by Pis s 1, a storage protein with high immunogenicity that triggers an excessive immune response in susceptible individuals. Pis s 1 stimulates IgE production, binding to mast cells and basophils, leading to the release of histamine, leukotrienes, and prostaglandins, causing symptoms like itching, swelling, and bronchospasm (Smits *et al*., 2021). Cross-reactivity with proteins from other legumes, such as peanuts, lentils, and chickpeas, complicates diagnosis, as shared epitopes like vicilin (Ara h 1 in peanuts) cause cross-reactions (Wensing *et al.,* 2003; Villa *et al.,* 2020). The immune response involves type 2 T helper cell activation, leading to IgE production and chronic mucosal inflammation. Repeated exposure activates mast cells, intensifying allergic reactions (Hildebrand *et al.,* 2021). Additionally, disruption of the gastrointestinal barrier allows Pis s 1 to trigger local immune responses, explaining gastrointestinal symptoms in some patients (Sharma *et al.,* 2015).

Genetic factors play a significant role in the pathogenesis of green pea allergy. Changes in the structure of IgE receptors or enzymes involved in inflammatory mediator metabolism can increase allergy risk. Patients with a family history of allergies are more likely to experience severe reactions, including anaphylaxis (Nowak-Węgrzyn *et al.,* 2017). While no specific gene has been definitively related to green pea allergy, polymorphisms in genes associated with the 2 T helper cell immune pathway, such as Interleukin (IL) 4, IL13, and Signal Transducer and Activator of Transcription (STAT) 6, are frequently implicated in IgE-mediated food allergies, including legumes. Variants in the Fc epsilon receptor I alpha subunit (FCER1A) gene, which encodes the alpha chain of the high-affinity IgE receptor on mast cells and basophils, have been linked to higher allergy sensitivity. Cross-reactivity may also be influenced by minor variations in legume proteins, such as lipid transport proteins, which can trigger allergic reactions even in small amounts, increasing the risk of anaphylaxis in sensitive individuals (Skypala *et al.,* 2021). Epidemiological data highlight regional differences in allergy incidence, with higher rates in countries with high legume consumption, suggesting the impact of dietary habits on sensitivity development (Crespo *et al.,* 1995). In conclusion, green pea allergy involves complex mechanisms, including immune activation, impaired mucosal barrier function, and genetic predisposition. Cross-reactivity with other legumes complicates diagnosis and treatment, requiring a detailed approach.

Evaluation of the effectiveness of diagnostic methods

Skin tests, such as scratch and prick tests, are the primary screening tools for allergy diagnosis, offering high sensitivity (85%) but moderate specificity (70%) in green pea allergy cases. Their advantages include rapid results and ease of use in clinical settings, though external factors like antihistamines or skin conditions may affect outcomes (Nowak-Węgrzyn *et al.,* 2017). Enzyme-linked immunosorbent assay (ELISA) for detecting specific IgE to green pea allergens achieves up to 95% sensitivity and 92% specificity. It is suitable when skin test results are inconclusive or contraindicated, despite its higher cost and equipment needs (Verma *et al.,* 2013). The oral provocation test, considered the diagnostic "gold standard," ensures 100% sensitivity and specificity but requires specialised centres due to the risk of anaphylaxis (Mastrorilli *et al.,* 2024).

Modern molecular allergology enables the identification of specific allergenic proteins, such as Pis s 1 and Pis s 2 in green peas, helping distinguish between primary and cross-allergies. This precision reduces misdiagnoses and unnecessary dietary restrictions (Popp *et al.,* 2020). Although these proteins are both immunogenic, their allergenic potential and clinical implications differ in certain ways. Pis s 1 is the most common allergen, causing severe reactions such as anaphylaxis, whereas Pis s 2 causes milder symptoms including oral allergy syndrome. Their interaction is important in co-sensitised individuals because combined exposure might exacerbate immune responses and result in more complex symptom patterns. Personalised medicine, based on molecular allergology and patient-specific data, allows for tailored treatment plans, including dietary adjustments, immunotherapy, or pharmacological interventions. Furthermore, customised tactics promote the use of targeted medicines, such as anti-IgE monoclonal antibodies, and allow for dynamic management by tracking changes in sensitisation patterns over time. New pharmacological approaches, such as monoclonal antibodies (e.g., anti-IgE therapy), offer promising treatment options by modulating immune responses (Cabanillas *et al.,* 2018). Specific immunotherapy also shows potential in gradually desensitising the immune system (Wensing *et al.,* 2003). A comparative evaluation of diagnostic methods requires analysis of their key characteristics, strengths, limitations, and indications (Table 1).

The analysis of the data shows that each diagnostic method has its strengths and weaknesses. Skin allergy tests are quick and affordable but have limited specificity. ELISA tests are highly accurate but require laboratory conditions. Provocative tests provide the "gold standard" of accuracy, although they are associated with a risk of severe reactions. Molecular allergology allows for the identification of specific allergenic proteins for a personalised approach but remains expensive. Innovations such as monoclonal antibodies and specific immunotherapy offer the prospect of modifying the immune response but require a long time to implement in practice.

The combined use of several diagnostic methods is the most effective. For instance, the initial screening with skin tests or ELISA can be supplemented by molecular allergy to identify specific allergen proteins and provocative tests are used to finally confirm the diagnosis. This approach can achieve a diagnostic accuracy of up to 98% (Jensen *et al.*, 2008). Thus, the effectiveness of diagnosing green pea allergy is greatly enhanced by the integration of traditional methods with modern technologies, such as molecular allergology and pharmacological innovations. A personalised approach is the key to accurate diagnosis and successful treatment.

Analysis of the prevalence of allergies

The prevalence of green pea allergy varies depending on geographical, social and environmental conditions, as well as genetic factors that determine the individual susceptibility to developing allergic reactions (Ibanez *et al.*, 2003, Mondal *et al.*, 2024). The global prevalence of green pea allergy is still understudied compared to other food allergens such as peanuts, milk or eggs. However, studies show that food allergies, including pea allergy, are more common in highly developed countries with a high level of urbanisation, due to changes in lifestyle and diet (Verma *et al.*, 2013). In Europe and North America, the prevalence of food allergies reaches 6-8%, including allergies to legumes, which include green peas (Lisiecka, 2024a; 2024b). In developing countries, the level of allergy to green peas is much lower. This may be due to different cultural eating habits and the lower popularity of pulses in the diet of most of the population.

There are certain regional differences in the prevalence of green pea allergy in different parts of the world. Analysing the

metric determines that the highest prevalence of green pea allergy is observed in Europe (7%) and the United States (6%), which confirms the trend towards a higher prevalence of food allergies in developed countries. This is possibly determined by the high level of consumption of green peas as part of a balanced diet and the availability of this product. At the same time, in Asia and Africa, the rates are lower (2% and 3%, respectively), which may be due to the lower popularity of this product in the diet and genetic characteristics of the population. The lowest prevalence rate (1.5%) was recorded in developing countries, which likely reflects limited access to green peas and low levels of food allergy diagnosis.

In Europe and the United States, legume allergy patients frequently react to peas, with high sensitisation levels due to the product's common inclusion in diets across all age groups (Muller *et al.,* 2022). In contrast, green pea allergy is less common in Asian countries, where traditional diets include green pulses, possibly due to earlier exposure and genetic tolerance to certain pea components (Martínez San Ireneo *et al.,* 2008). Social and environmental factors, such as urbanisation, pollution, and climate change, significantly impact the prevalence of green pea allergy (Komilova *et al.,* 2023; 2024).

Pollution and stress in urban areas can trigger immune hyperreactivity, increasing the risk of food allergies, including to green legumes (Pastorello *et al.,* 2010). Changes in dietary habits, like increased consumption of processed foods, further contribute to allergy prevalence (Pham and Rudner, 2000). Conversely, rural areas with traditional diets and lower pollutant levels may reduce sensitisation (Matheu *et al.,* 1999). Thus, green pea allergy prevalence is influenced by geographical, environmental, and social factors, which are crucial for developing effective prevention and treatment strategies and understanding the disease's pathogenesis.

International recommendations and their implementation

International organisations play a key role in developing global food allergen risk management standards to protect consumer health. The UN, EU, World Health Organisation (WHO), and European Food Safety Authority are working on recommendations to improve food safety and reduce allergen risks. The Codex Alimentarius, under the UN, provides guidelines for managing food contamination and allergen labelling, ensuring transparency for consumers (Branca, 2024). WHO supports standardising allergen management approaches and creating a global allergic reaction database, emphasising the need for testing even minimal allergen amounts and improving communication between producers, healthcare professionals, and consumers (Food and Agriculture, 2001).

NATO and Interpol, while primarily focused on security, also contribute to food protection efforts. NATO aids in improving food safety management in vulnerable regions and developing standards to protect food from chemical threats, including allergens. Interpol combats food fraud, which may involve the intentional or accidental use of allergenic ingredients. These efforts are reflected in the daily practices of food producers, including the implementation of the Hazard Analysis Critical Control Point (HACCP) system to identify and eliminate allergenic contamination (U.S. Food and Drug Administration, 2022). Manufacturers also adopt advanced testing methods based on WHO and European Food Safety Authority standards. The EU's allergen labelling system allows consumers to avoid products containing allergens, such as green pea proteins. By following the standards set by the UN, EU, and European Food Safety Authority, countries can reduce allergen risks, improving public health and confidence in food safety systems.

Research gaps and new perspectives

Previous studies on green pea allergy have improved understanding of its clinical features and diagnosis but have key

limitations. Most research focuses on small samples, neglecting ethnic, geographical, and cultural factors that affect allergy prevalence. While traditional allergens have been well-studied, green pea proteins remain understudied, and cross-reactivity with other legumes complicates diagnosis. Current diagnostic methods may miss trace amounts of allergens, highlighting the need for more precise tools. A promising area of research is exploring genetic factors influencing susceptibility to green pea allergy, which could help identify risk groups and enable personalised prevention and treatment. Studies on food processing impacts, such as heat treatment or fermentation, may reveal ways to reduce allergenicity and create safer products. Social aspects, like public awareness of allergies, also warrant further study, especially in regions with limited access to food safety knowledge.

The results of the study highlighted the main aspects of green pea allergy, including its clinical manifestations, pathogenesis and diagnostic methods. Regional differences in prevalence were identified. At the same time, the identified research gaps open new perspectives for improving prevention and diagnosis, which will be the basis for further discussion in this section. According to Smits *et al.* (2021) and Pham and Rudner (2000), green pea allergy is common among individuals also allergic to legumes like chickpeas. This aligns with the current study, which confirms frequent sensitisation to green pea proteins due to widespread consumption. Hildebrand *et al.* (2021) and Villa *et al.* (2020) highlighted significant cross-reactivity among legumes such as peas, chickpeas, lupins, and peanuts, underlining the value of molecular allergology for precise allergen identification. Jensen *et al.* (2008) further showed that sensitisation to one legume often results in reactions to others due to protein homology.

These findings correspond with the role of Pis s 1 and Pis s 2 proteins, which warrant deeper investigation. Skypala *et al.* (2021) noted the high allergenic potential of nonspecific lipid transfer proteins due to their resistance to heat and digestion, supporting observations on Pis s 1 and Pis s 2. Similarly, Cabanillas *et al.* (2018) stressed the stability of storage and lipid transfer proteins, explaining persistent allergenicity post-cooking. Mastrorilli *et al.* (2024) highlighted the severe impact of IgE-mediated legume allergies in children, including skin reactions and anaphylaxis, findings that mirror those in the present study. Webber and England (2010) discussed the diagnostic challenges, especially with low allergen levels, underscoring the need for more sensitive tests. Muller *et al.* (2022) confirmed the high accuracy of oral provocation tests for legume allergy, while noting the risks associated with their use. Mansoor and Sharma (2011) noted a wide range of clinical manifestations of food allergy, including severe cases of anaphylaxis. Such data are confirmed by the results of the study, which indicates the need for a personalised approach to the treatment of green pea allergy. Recommendations by Nowak-Węgrzyn *et al.* (2017) on the management of food allergens are also noteworthy. Although the authors addressed other allergies, standardisation of approaches to food safety can be effective in the case of green pea allergy.

Crespo *et al.* (1995) highlighted the role of regional factors in food allergy prevalence, aligning with this study's findings that geography and dietary habits influence green pea allergy rates. Pastorello *et al.* (2010) identified IgE-binding proteins, such as lipid transport proteins in green beans, as potent allergens – consistent with this study’s results on Pis s 1 and Pis s 2 in green peas, supporting their further investigation for improved diagnostics and product safety. Matheu *et al.* (1999) and Kalogeromitros *et al.* (1996) reported anaphylaxis due to lupine and lentils, attributing it to cross-reactivity – a pattern also observed in green pea allergy, underscoring the need for thorough allergological assessment. Ibanez *et al.* (2003) explored monoclonal antibodies to regulate immune response, supporting this

study's proposed pharmacological strategies for managing severe green pea allergies. Vitaliti *et al.* (2015) demonstrated that even cooking vapours from legumes can trigger severe reactions in children, aligning with this study's findings on the broad clinical spectrum of green pea allergy.

Chan *et al.* (2019) advocated molecular allergology for identifying specific allergens in cross-reactive cases, reinforcing this study's recommendation to employ such methods for accurate green pea allergy diagnosis. The results confirm that the use of modern molecular allergy techniques, improved provocation tests and geographical considerations are key to the effective diagnosis and treatment of green pea allergy. Comparison with the current literature indicates the importance of these areas while highlighting the need for further research to develop personalised approaches and novel therapeutic strategies.

CONCLUSIONS

The findings significantly advance understanding of green pea allergy, confirming the study's objective. A broad spectrum of symptoms was observed – skin, respiratory, gastrointestinal, and severe forms like anaphylaxis – varying by age, allergen exposure, and individual factors. Children, particularly with skin symptoms, were a key focus. Pis s 1, a highly immunogenic storage protein, induces IgE production and triggers allergic cascades. Notable cross-reactivity with legumes such as peanuts, chickpeas, and lentils was identified. Skin tests remain a primary screening tool due to accessibility, though specificity is limited. ELISA showed up to 95% accuracy for detecting IgE to Pis s 1 and Pis s 2, while provocation tests offer 100% sensitivity and specificity. Molecular allergology enhances precision in allergen identification and cross-reactivity management.

The prevalence of green pea allergy is influenced by regional, social, and cultural factors, with urbanisation, dietary habits, and environmental pollution affecting sensitisation levels. This highlights the need for tailored diagnostic and prevention approaches. Molecular methods should be more widely used to identify specific allergens and manage cross-sensitisation. Personalised treatment plans, including immunotherapy and monoclonal antibodies, should be developed based on individual characteristics. International standards for allergen labelling should account for even minimal allergenic protein amounts. These findings can directly influence real-world allergy management by encouraging the use of molecular diagnostics to properly identify particular green pea allergens, providing more precise dietary advice and decreasing unnecessary food restrictions. Furthermore, the emphasis on tailored treatment approaches promotes the development of safer, more targeted therapies for patients who are at high risk of severe allergic reactions.

Despite significant findings, the study has limitations, including a potentially unrepresentative patient sample and reliance on available diagnostic methods, which may have affected allergen detection. Cross-reactivity aspects, particularly in food processing, were not fully explored. Practical implementation of recommendations requires further research in clinical settings.

CONFLICT OF INTEREST STATEMENT

The author declares that she has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Table 1: Characteristics and comparison of methods for diagnosing green pea allergy

Diagnostic method	Sensitivity	Specificity	Advantages	Disadvantages	Indications for use
Skin allergy tests	85%	70%	Quick results, accessibility, low cost	Possible false-positive results due to cross-reactivity; limitations in patients with skin diseases or on antihistamine therapy	Initial screening in patients with suspected allergies
Immunofluorescence assay (IFA) (IgE to Pis s 1, Pis s 2)	90-95%	87-92%	High precision, the ability to perform without the risk of allergic reactions	High cost, need for specialised equipment	Use in difficult cases or when skin testing is not possible
Oral provocation test	100%	100%	The "gold standard" of diagnostics, the highest accuracy	Risk of anaphylaxis, need for specialised conditions	Confirmation of diagnosis in controversial or complex cases
Molecular allergology	High	High	Identification of specific allergenic proteins, accurate cross-reactivity analysis	High cost, limited availability	Differential diagnosis of allergies, personalised approach
Monoclonal antibodies	Not defined	Not defined	Modulate the immune response, and reduce the risk of severe reactions	Cost and duration of treatment	Treatment of complex forms of allergy
Specific immunotherapy	High	High	Adapts the immune system to the allergen, long-lasting effect	Long-term therapy, the need for regular monitoring	Treatment of confirmed green pea allergy

Source: compiled by the author based on comparative analysis of data (Verma *et al*., 2013; Sell *et al*., 2005; Popp *et al*., 2020; Mastrorilli *et al*., 2024; Skypala *et al*, 2021).