

The Skin Allergy Test is Indispensable as a Specific and Inexpensive Screening Method in the Diagnosis of Allergic Diseases

Siniša Franjić

Independent Researcher

Corresponding Author: Siniša Franjić, Independent Researcher.

Received date: October 8, 2024; **Accepted date:** October 27, 2024; **Published date:** October 31, 2024

Citation: Siniša Franjić, The Skin Allergy Test is Indispensable as a Specific and Inexpensive Screening Method in the Diagnosis of Allergic Diseases, *Skin Science and Skin Inflammations*, vol 1(1). DOI: 10.9567/ISSN.2024/WSJ.92

Copyright: © 2024, Siniša Franjić, this is an open-access article distributed under the terms of The Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Allergological treatment is recommended for any suspicion of an allergic nature of the disease, regardless of the patient's age. The skin allergy test is indispensable as a specific and sensitive, fast, reproducible and inexpensive screening method in the diagnosis of allergic diseases.

Keywords: Skin, Allergy, Testing, SPT, Health

Introduction

It has been known since the end of the eighteenth century that resistant reactions in certain occurrences are went with by antagonistic responses extending from local skin disturbance to deadly anaphylactic shock [1]. These conditions are lumped together beneath the umbrella of 'hypersensitivity', a term reflecting the prior elucidation that they speak to an eruption to poisonous components of the antigen. In any case, it had before long ended up clear that non-toxic substances, such as serum infused from one person into another might also cause comparable side effects, implying at an immunological or maybe than poisonous instrument. That certain human conditions, presently known as sensitivities, counting feed fever and asthma have a place to the bunch of hypersensitivities was also proposed in the early twentieth century. The thought, be that as it may, that safe reactions might cause infection showed up to be beyond reconciliation with the defensive work of insusceptibility, and as a result, touchiness inquire about was cleared out to clinicians, and has remained exterior of 'mainstream' immunology for a long time.

Allergies as a rule activated by something else safe 'environmental' antigens speak to the most visit sort of touchiness. Their pathomechanism was a matter of warmed wrangles about in the to begin with decades of the twentieth century. Interests, a few of the early suspicions, e.g., that sensitivity is caused by a extraordinary course of antibodies (called reagins), and that such antibodies are cytotoxic, have afterward been affirmed tentatively.

Skin Testing

Skin testing is based on evoking a auxiliary reaction to an antigen to which the quiet was already sensitized [2]. A little sum of dissolvable antigen is infused intradermally on the extensor surface of the lower arm. The antigens utilized are more often than not microbial in beginning [e.g., filtered protein subsidiary of tuberculin, tetanus toxoid, mumps antigens, and a assortment of parasitic extricates, counting Candidin (from *Candida albicans*), coccidioidin (from *Coccidioides immitis*), and histoplasmin (from *Histoplasma capsulatum*)].

The range of the skin getting the infusion is watched for the appearance of erythema and induration, which are measured at 24 and 48 hours after the infusion. A positive skin test is ordinarily considered to be related with an zone of induration more prominent than 10 mm in distance across, but in patients with obtained immunodeficiency malady induration more noteworthy than 5 mm in distance across is considered positive. If no response is watched, the test may be rehashed with a higher concentration of antigen.

If a persistent has no response after being tried with a battery of antigens, it is accepted that a state of anergy exists. Anergy can be caused by immunological insufficiencies, contaminations (such as measles or persistent dispersed tuberculosis), but it can too be the result of blunders in the strategy of skin testing.

Although these tests have the hypothetical advantage of testing the work of the T-cell framework in vivo, they meet with a assortment of issues. On one hand, skin tests are troublesome to duplicate, due to the trouble in getting consistency among diverse

sources and bunches of antigens, and to varieties in the procedure of immunization among distinctive agents. On the other hand, the elucidation of negative tests has to be carefully weighed. Negative comes about after challenge with antigens to which there is no record of past presentation can continuously be addressed, whereas a negative result with an antigen extricated from a microbial specialist, which has been recorded as causing disease in the understanding, has a much more grounded demonstrative noteworthiness, suggesting a useful deformity in cell-mediated immunity.

ASPT

Allergy skin prick testing (ASPT), in conjunction with a careful clinical history, is the favored symptomatic strategy for IgE-mediated response to natural allergens [3]. Comparative examinations have appeared SPT to have the most elevated positive prescient esteem among accessible demonstrative apparatuses for hypersensitivities. SPT is approved, secure, dependable, generally reasonable and effortlessly performed in the outpatient setting. One advantage to SPT is that comes about are accessible to the clinician and persistent instantly after the procedure.

Skin testing as a strategy of diagnosing unfavorably susceptible sensitization was to begin with depicted in 1865 by Charles Blackley, who performed tests during which he made scraped spots in the skin and secured them with watery grass dust on a piece of damp build up. The grass dust was kept over the rubbed skin with a piece of dry occlusive gauze for six hours. SPT got to be broadly utilized in the 1970s after Pepys presented a adjusted procedure in which a hypodermic needle was passed through a drop of watery allergen put on the skin. Instep of puncturing the skin, the tip of the needle was utilized to delicately lift the skin surface in an upward movement, gently and externally disturbing the skin. In this way, cutaneous pole cells are successfully uncovered to the allergen without skin cut. This method advanced into present day SPT which is routinely done today.

Skin-prick testing, in which a little sum of allergen is epicutaneously connected to the skin and the persistent is watched for advancement of a wheal and flare response, is utilized for food allergy testing [4]. Both in vivo and in vitro food testing have great positive and negative prescient values. Skin testing in specific has been appeared to reduce the require for DBPCFC. The preferences of skin-prick testing are that comes about can be gotten instantly, and a wheal and flare response gives more data almost the patient's in vivo reaction to allergen. The drawbacks of skin-prick testing, compared to RAST, are that more pricks are done and the method is possibly more traumatic-especially for children. Skin testing is contraindicated in a number of conditions, counting the utilize of β -blockers, skin conditions such as skin inflammation or hives, a history of anaphylaxis, and the utilize of antihistamines (that can nullify the comes about of the skin testing). Intradermal testing is not for the most part utilized in testing for food allergies since of the tall recurrence of untrue positives and need of specificity.

Clinical adequacy can be assessed by the clinical indications, as the essential result (diverse side effect scores can be included, i.e., the nose, the eyes, and the respiratory tract) [5]. As the add up to burden for the patients is a combination of side effects and the require for protect drugs, drugs require to be taken into account to

provide a total picture of the disease-reducing capacity of immunotherapy. Pharmaceutical score giving a separated weight to the drugs utilized agreeing to their relative strength (corticosteroids score higher than anti-histamines) ought to be included in the essential result. Either indication score and medication score might be dealt with independently and at that point combined to a common score or they seem be scored all inclusive as a add up to side effect score. Skin tests, conjunctival, and nasal incitement tests are utilized in a few considers as auxiliary end-points, they are performed some time recently treatment, after the to begin with dust season and/or 1 year after starting the immunotherapy infusions. Movement of an allergenic extricate utilized for immunotherapy may be assessed by clinical and organic markers: adjustment of cutaneous tests, adjustment of particular IgG (particularly IgG1 and IgG4), particular IgE.

SPT is shown if a sort I (quick sort) sensitivity is suspected, based on the therapeutic history and clinical side effects; they can recognize affectability to inhalant, food, drug or word related allergens [6]. SPTs hence give objective affirmation of affectability, while the significance of such affectability to allergens ought to continuously be carefully translated in the light of the clinical history so that fitting exhortation concerning shirking measures can be given and, as essential, the adjust allergen(s) endorsed for particular immunotherapy (SIT). SPT comes about relate with those of nasal challenge which may moreover be utilized as a surrogate to test clinically important sensitization.

Another sign of SPT is to screen for a inclination to create atopic illnesses, which can be done with a constrained number of allergens, or to recognize all sensitized subjects in a given populace. SPT too can be utilized in epidemiologic considers to decide patterns in sensitization

rates or territorial contrasts and to offer assistance standardize allergen extracts.

SPT is utilized to test adults and children from birth onwards. Rehashed testing may be essential in arrange to distinguish unused sensitizations, particularly in children, when side effects alter, or if modern natural allergens are suspected.

Mechanism

The instrument of SPT includes inciting a localized extreme touchiness response on the skin by uncovering cutaneous pole cells to fluid arrangements of allergens [3]. The cutaneous pole cells of a persistent sensitized to an aeroallergen have surface IgE receptors that crosslink and cause degranulation of its substance when uncovered to sufficient aeroallergen locally. Upon degranulation, the pole cell discharges its proinflammatory go between which comes about in a raised wheal and erythema unmistakable on the skin surface. This response is at that point measured and compared against positive histamine and negative saline control. A positive response to SPT is prove of sensitization but does not continuously connect to the nearness of a clinically pertinent hypersensitivity. Prove of sensitization through skin prick or serum testing alone is not adequate for determination without clinical history of reaction.

Techniques

There are two common methods of skin testing: prick/puncture

and intradermal testing [3]. The prick strategy is the most suitable to begin with step and is performed by applying little drops of fluid arrangements of allergens in either a 1:10 or 1:20 weight:volume extricate arrangement on the skin of the back or the front surface of the lower arms. The beads may be connected independently in a successive way or by utilizing commercially accessible implements that apply a few diverse aeroallergens to person zones of the skin at once, regularly utilizing lancets coated with the allergen. Beads ought to be connected at a least of 2 cm separated to guarantee exact perusing of the comes about. Standardized boards for SPT by and large comprise of common territorial aeroallergens (trees, grasses and weeds) as well as creature danders, dust mites, cockroaches and molds. In spite of the fact that numerous extricates are standardized, SPT can be customized for person patients through puddle testing, whereby watery arrangements are made from inhalants or foods blended with saline and at that point connected to the skin.

After arrangement, estimations of both the wheal and erythema are taken, if display. The histamine control is measured around 10 minutes after situation and the rest are examined around 15–20 minutes after arrangement. A result is considered positive if the wheal distance across measures 3 mm × 3 mm or more with negative saline control.

Penicillin

It has been detailed that all touchiness responses can be caused by penicillins (types I–IV), with the most noteworthy rate of type I-IgE interceded touchiness responses [7]. Type I, II, and III extreme touchiness responses happen through the advancement of hapten-carrier complexes. Whereas penicillin sensitivity is the most commonly detailed mediate sensitivity, comprising roughly 10% of the U.S. populace, over 90% of patients can really endure re-exposure.⁵ This is in portion due to the misfortune of sensitization additional time, as roughly 80% to 90% of unfavorably susceptible patients will lose their affectability with 10 years of avoidance. Drug allergy assessment ought to be considered for about all patients with a history of penicillin allergy as later considers have appeared carrying a penicillin allergy name can have critical clinical results. These incorporate the more visit utilize of second-line antibiotics, expanded treatment failure rates, longer healing center remains, expanded hazard for the improvement of safe life forms, *Clostridium difficile* diseases, and higher rates of surgical location diseases perioperatively.

For evaluation of a sort I IgE-mediated allergy, skin testing and/or coordinate challenges have been utilized successfully. Different protocols have been distributed to help in risk-stratifying patients to decide if skin testing is essential or if the quiet can go straightforwardly to an watched challenge. For skin testing, regularly both major and at slightest one minor determinant (ordinarily benzylpenicillin) are tried, in spite of the fact that there is need of consistency of which minor determinants ought to be utilized. There is critical cross-reactivity between penicillins, in spite of the fact that in Europe, there are higher reports of separated sensitivity to amoxicillin, which is not watched in the United States, conceivably making more broad skin testing to incorporate amoxicillin a minor determinant useful for select high-risk patients. As of now, there are no commercially accessible skin test reagents for amoxicillin and all of the minor determinants, so skin testing with benzylpenicilloyl polylysine

and benzylpenicillin taken after by amoxicillin verbal challenge is the most commonly utilized strategy for penicillin skin testing in the United States.

Assessment of type IV touchiness responses is less standardized. Deferred skin testing and fix testing have been endeavored but comes about have been conflicting. It is not right now prescribed for clinical practice, subsequently, verbal challenges are the proposed strategy of evaluation. Cautious history taking remains foremost as challenges are generally contraindicated for responses reliable with drug-induced cytopenias, vasculitis, and SCARs. If there is a concern for a kind, delayed-type response, organization of a single-dose amoxicillin 250 mg challenge with at domestic evaluation over 1 week for a potential postponed exanthem is a sensible option.

In penicillin allergy, the degree of similitude of the R-group side chains decides the sum of cross-reactivity. In a later meta-analysis of patients with demonstrated penicillin sensitivity (generally aminopenicillins), indistinguishable R-groups had a 16.45% chance of cross-reactivity with as it were 2.11% in different R-groups. Carbapenem cross-reactivity to penicillins was indeed lower at 0.87%.²⁵ The rates of cross-reactivity are likely much lower in patients with self-reported penicillin allergy since >95% of such patients when tried are not really allergic.

NPC

The Nasal Provocation Challenge (NPC) has been illustrated to be an compelling symptomatic apparatus for unfavorably susceptible and non-allergic rhinitis in inquire about conventions but is not as broadly utilized clinically in the United States [3]. NPC is performed by straightforwardly putting an watery arrangement of allergen extricate singularly to the nasal mucosa and along these lines evaluating clinical parameters of hyperresponsiveness and unfavorably susceptible sensitization. The allergen extricate chosen can be one to which the quiet has illustrated sensitization on skin prick or serum-specific IgE testing. Then again, it can be an allergen to which a quiet does not appear sensitization on SPT or serum-specific IgE testing but is a likely offender based on clinical history. The objective of the NPC is to duplicate the touchiness reaction beneath directed and controlled conditions.

An implement device is set into the more extensive nostril of the quiet and conveys 50 to 100 microliters of test arrangement into the nose. Ten minutes after conveyance, clinical parameters of sensitization are assessed utilizing the total nasal symptom score (TNSS). The TNSS is a clinical calculator in which patients review their side effects of nasal blockage, rhinorrhea, sniffing, and nasal pruritus from 0–3 to degree indication seriousness with 12 being the most serious score. Rhinoscopic examination with evaluation of nasal wind current by front rhinomanometry is moreover performed both some time recently and after the application of topical allergen arrangement to build up a pattern exam and decide clinical response.

Using these strategies, NPC employments both subjective and objective estimations to decide the clinical response. The NPC is considered positive if the score is over a certain limit, ordinarily more noteworthy than three. The NPC is too considered positive if front rhinomanometry uncovers a more prominent than 40% diminish of nasal wind current after organization of aeroallergen, in any case of clinical side effect score.

Spirometry

Spirometry is the “gold standard” objective symptomatic test for obstructive aviation routes maladies, counting asthma [8]. The trademark include of asthma is expiratory wind stream confinement and its inconstancy with time, either with or without treatment. Spirometry makes a difference in reporting both of these highlights. The move of spirometry can be separated into six steps as below:

1. Exhale out completely
2. Take a profound inward breath and fill up the lungs completely
3. Hold the mouthpiece in between the teeth, clasp it in an air proof way and seal the lips
4. Blow out discuss into the mouthpiece with most extreme force
5. Proceed to blow out the discuss till a level of 1 moment is gotten or up to a greatest of 15 seconds
6. Inhale deeply and forcefully

Since this is an effort-dependent test, the informational that are given to the patients have to be exceptionally clear to guarantee that the quiet gets it how to perform each step. A exhibit to the understanding will be valuable and essential. The expertise of the specialist in utilizing voice tweak, viable body dialect and exhibit is of most extreme significance. A few trials runs with as it were the mouthpiece also offer assistance the persistent to perform the test accurately. We require to get three satisfactory charts from the patients and of the three, the two best require to be reproducible.

Conclusion

Despite the development of modern diagnostic methods in allergology, the skin allergy test remained indispensable as a specific and sensitive, fast, reproducible and inexpensive screening method in the diagnosis of allergic diseases. At least three days before the skin test, the patient must not use anti-allergic drugs or any other drugs that may affect the test results. The doctor must have information about the patient's condition, allergies, as well as severe allergic reactions or chronic diseases. It is recommended to use a skin prick test in everyday practice for allergy testing. The prick test is more specific than the intradermal

one, and the disposable lancet used to perform it increases reproducibility. This test is safer for the patient due to the low risk of severe side effects as well as the impossibility of transmitting infectious diseases.

References

1. Nagy, Z. A. (2014.): „A History of Modern Immunology - The Path Toward Understanding“, Academic Press, Elsevier, London, UK, pp. 12. – 13.
2. Sleasman, J. W.; Virella, G. (2007.): „Diagnosis of Immunodeficiency Diseases“ in Virella G. (ed): „Medical Immunology, Sixth Edition“, Informa Healthcare USA, Inc., New York, USA, pp. 405.
3. Kwiat, C.; Nelson H.; Hoyte F. (2024.): „Diagnosis of Allergy and Asthma“ in Vedanthan, P. K.; Nelson, H. S.; Van Bever, H. P. S.; Murali, M. R. (eds): „Textbook of Diagnostic and Therapeutic Procedures in Allergy“, CRC Press, Taylor & Francis Group, LLC, Boca Raton, USA, pp. 34. – 36.
4. Chang, C. (2004.): „Allergies and Nutrition“ in Gershwin, M. E.; Nestel, P.; Keen, C. L. (eds): „Handbook of Nutrition and Immunity“, Humana Press Inc., Totowa, USA, pp. 171. – 172.
5. Pauli, G.; Malling, H. J. (2011.): „Allergen-Specific Immunotherapy with Recombinant Allergens“ in Valenta, R.; Coffman, R. L. (eds): „Vaccines against Allergies“, Springer-Verlag Berlin Heidelberg, Berlin, Germany, pp. 46.
6. Heinzerling et al.: The skin prick test – European standards. Clinical and Translational Allergy 2013 3:3.
7. Joshi, S. R.; Salinas, W.; Khan, D. A. (2023.): „Drug Hypersensitivity“ in Rich, R. R.; Fleisher, T. A.; Schroeder jr., H. W.; Weyand, C. M.; Corry, D. B.; Puck, J. M. (eds): „Clinical Immunology - Principles and Practice, Sixth Edition“, Elsevier, Philadelphia, USA, pp. 640. – 641.
8. Salvi, S.; Ghorpade, D.; Barne, M. (2024.): „Diagnosis of Allergies and Asthma“ in Vedanthan, P. K.; Nelson, H. S.; Van Bever, H. P. S.; Murali, M. R. (eds): „Textbook of Diagnostic and Therapeutic Procedures in Allergy“, CRC Press, Taylor & Francis Group, LLC, Boca Raton, USA, pp. 42. – 44.