Practice Parameter: Clinical Guidelines for Allergy Skin Prick Test

Indian Academy of Pediatrics – Allergy and Applied Immunology Chapter

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INTRODUCTION:

Skin prick test (SPT) is an essential part of the diagnostic armamentarium of every allergy specialist. SPT is a reliable diagnostic method to confirm IgE mediated hypersensitivity reactions. SPT is an in vivo assay of specific IgE antibodies to different antigens. There are two other skin testing diagnostic methods namely- (a) Intradermal testing (IDT) which is relevant to delayed type hypersensitivity & some IgE mediated hypersensitivity;(b) patch testing which is relevant to contact hypersensitivity. In SPT, allergens are introduced into the skin epidermis & superficial non-vascular dermis part, which induces a wheal & flare response in 15 minutes. The specific IgE bound to cutaneous mast cells gets cross linked and degranulate releasing mediators like histamine and few others. When performed with appropriate allergens to the condition being tested, SPT has good sensitivity and specificity compared to in vitro specific IgEtesting. Helmtraud Ebruster laid the groundwork for SPT in 1959, who studied extensively on this primary diagnostic test. The principle of SPT largely resembles the original method, but there has been significant differences in extracts used, testing devices and interpretations making comparisons of results, arduous.

This practice parameter presents standardized guidelines on pretest considerations, method of testing and interpretation in a concise manner for a practising allergist.

PRETEST CONSIDERATION:

Before initiating the SPT, Choosing the right patient with definite indications along with allergens based on medical history and symptomatology is utmost essential

Patient selection:

- Any age can be tested
- Skin testing in <2 years of age should be performed by a specialist • Skin reactivity may decline in >60 years of age.

Indications for skin prick testing:

- Rhinitis/ rhinosinusitis
- Rhinoconjunctivitis/ allergic conjunctivitis
- Asthma

• Atopic dermatitis
• Food allergies manifesting as acute urticaria, anaphylaxis or acute flare up of eczema
• Suspected latex allergy
• Chronic urticaria if history suggests allergic features • Rare conditions like ABPA, eosinophilic esophagitis, eosinophilic gastroenteritis

NOT INDICATED IN:

• Chronic urticaria in absence of allergic features
• Reactions to respiratory irritants, food additives, non-allergic adverse reactions to drugs
• Allergy screening with no atopic history

CONTRAINDICATIONS:

ABSOLUTE	RELATIVE
Severe dermatographism	Severe/ unstable asthma
Diffuse skin disease	Patient on Beta blockers, ACE inhibitors
Patient unable to stop drugs interfering with SPT	Pregnancy
	Systemic diseases interfering with skin reactivity- recent anaphylaxis, CRF, CVA, spinal cord injury, diabetic neuropathy

Drugs that interfere with SPT results:

Certain drugs like anti histamines or drugs with anti-histamine activity interferes with skin testing. Patients on these drugs should be asked to withhold for a specified period of time prior to skin testing (ref-table)

ANTI HISTAMINES	
DRUG	Abstinence before testing
1st gen H1 blocker:	
Chlorpheniramine	3 days
Diphenhydramine	4 days
Hydroxyzine	8 days
Promethazine	5 days
Cyproheptadine	11 days
Ketotifen	5 days
2nd gen H1 blocker:	
Cetirizine	3 days
Fexofenadine	2 days
Loratadine	7 days
Nasal azelastine	2 days
H2 blockers	1 day

GLUOCO CORTICOIDS:	
Topical Corticosteroids > 3weeks	2-3 weeks
Systemic steroids:	--
Other systemic drugs:	
Omalizumab	>4 weeks
Topical calcineurin inhibitors	>1 week

Drugs with no interference on skin testing:

Leukotriene receptor antagonist
Cyclosporine A
Theophylline
Beta agonists
Nasal & inhaled steroids
Local anesthetic EMLA

(There are dissenting opinions about long term and high dose corticosteroids {>20mg/d} on skin test reactions 9,10)

Allergen selection:

Allergens for SPT are selected based upon the clinical profile of the patient. For children upto 10 allergens can be tested in a single sitting. Perennial aeroallergens namely: house dust mite, cockroach, molds, pollens along with food allergens are tested.

Personnel & training:

Skin prick test can be carried out by allergy specialists. It can also be done by other specialists (pediatricians, general physicians, thoracic physicians) or paramedical health workers with formal training in allergy.

Things needed for SPT:

- ➢ Consent form
- ➢ Recording sheet
- ➢ Timer
- ➢ Skin marker
- ➢ Alcohol swabs
- ➢ Antigens/ allergens with controls
- ➢ Lancetter
- ➢ Measuring scale

Procedure

Requirements For Skin Prick Testing Procedure:

Allergen extracts	Positive amd Negative control solutions
Sterile lancets for skin pricking	Marker pen for the skin
Ruler for measuring reactions	Tissues for wiping solutions, Recording sheets and Gloves

PRE-REQUISITES

Patients should be discontinued on medications that interfere with test results. In patients with a history of severe systemicallergic reactions to food or drugs, an intravenous

line for immediatecirculatory access can be recommended. A peak flow of less than 70% inpatients with asthma is a relative contraindication. Asthma should becontrolled or testing deferred until control is achieved. When testingpatients with a history of a severe systemic allergic reactions, skin testtitration, first utilizing diluted extracts, is recommended. SPT shouldideally be performed at least 4-6 weeks followinga systemic allergicreaction, in particular, for Hymenoptera hypersensitivity.

SITE OF APPLICATION

The location of each allergen can be marked with a pen on the forearm to properly identify test results. Tests should be applied to the volar aspect of the forearm, at least 2-3 cm from the wrist and the antecubital fossae. The back can also be used for SPT, especially in infants. The skin on the back is more sensitive than the forearm which may result in larger wheals and thus possibly a greater number of positive test results. The distance between two skin prick tests (> 2 cm) is critical to avoid false-positive reactions due to direct contamination of a nearby test or secondary to an axon reflex.

SELECTION OF ANTIGENS

There is no fixed number of antigens. The number of ST is based upon patient's age, history, location, exposure to allergens, genetic tendency and socio-economic factors. Testing for large number of allergens (>100) is generally unacceptable and unnecessary.

Skin testing for a few major and relevent allergens is clinically sufficient. There are three major classes allergens.

1) **INHALANTS:** The Inhalants are further classified as **indoor antigens** (e.g., house dust mites, cockroachs, pets and molds) and **outdoor antigens** (e.G., tree, grass, weed pollens and mold spores)
2) **Ingestants** (Foods)
3) **Injectable** (Venoms)

TECHNIQUE

The Basic idea of AST in general, is to introduce a very small amount of the antigen into the dermis through the surface of the stratum corneum. The mast cells are located in the dermis and on specific interaction of the antigen with the specific IgE, The mediators will be released to cause the wheal and flare reaction.

Prick ST: A drop of the antigen is placed on the skin and a sharp indtrument is passed through the drop, penetrating the skin at apporximately a 45 degree angle. The device is then lifted, creating a small break in the epidermis. It is estimated that only 0.3 microliters of fluid is introduced into the skin.

AST is the most rapid, safe, simple, cost efffective and clinically relevent, method for detecting allergenic sensitization.

- Documentation: Preparation of the allergy skin test recording sheet.
- Self introduction to the patient and family.
- Detailed explanation of the procedure to the patient and family.
- Preparation of the area of skin to be tested (the back upper arm, forearm) by cleaning the site with 70 percent alcohol swab and then following it to dry.
- Marking of the test sites: with a skin marking pen the sites are numbered in a chronological order starting generally with Negative Saline control and ending with Positive Histamine control.
- Placement of minute drops of the antigen are placed on the marked sites observing extra precautions in matching the exact order and numbering on the ST recording sheet.

- Pricking swiftly the test site with the skin testing needle throungh the drop of antigen.
- Wiping off any excess antigen will not affect the test results.
  - ★ Use very small amounts of antigen for testing since omly 0.3 microliters will enter the dermis.
  - ★ It is important to measure the maximum wheal diameters that are perpendicular to each other.

TIMING OF READING RESULTS

A timer, with an alarm, should be utilized so that all tests, including the histamine and negative control test results are read 15-20 minutes following application. Such that for test results is recommended even though the histamine control can peak earlier at approximately 8-10 minutes.

INTERPRETATION

Positive and Negative Controls

Negative Saline control is interpreted as acceptable between 0-3mm in diameter. Positive histamine controlhas to be 3mm larger than the negative saline control. A positive ST is interpreted as
3mm or > higher than the negative saline control.

A histamine positive control less then 3mm in diameter suggests interference such as suppression by antihistamines.

CORRELATION OF ALLERGY SKIN TESTS

- **In vitro measurement:** There is good correlation between Prick ST and ImmunoCap up to nearly 80 percent.
- There is positive correlationship between the size of the reaction of HD mite and asthma.
- **Bronchial challenge:** There seems to be a direct correlation of skin test reactivity and bronchial inhalation challenge to antigens like HD mite, Altenaria, Bermuda grass.
- **Food Sensitivity:** There is correlation between the size of the wheal, grading score of the Immunocap, and clinical sensitivity to food items like peanuts, milk, eggs and fish.
- **Predictive value of AST:** Long term follow up studies by Hagy and Settipane have demonstrated a strong correlation of Positive ST and development of allergic rhinitis/ asthma.
- **Effect of specific allergen immunotherophy:** There will be a decline in the ST reactivity after 3 years of allergen immunotherapy treatment.

CONCLUSIONS:

- Allergy skin testing is extremely useful in diagnosing sensitization.
- AST is a highly reliable, safe, quick, and a very useful tool in the hands of a allergy specialist.
- It is preferable to express the AST measurements in mm rather than using a semiquantitative grading system.
- Vigorous wiping of the same testing needle with a wet sponge is definitely preferable to dry cotton. It also facilitates quicker testing compared to changing needles for each antigen to be tested.
- Blotting of the test site immediately after pricking does not seem to influence the final size of the resulting reaction, this is very helpful especially in the pediatric age group.
- AST can be positive even in clinically asymptomatic subjects.

- When reporting the results of the AST, thę term ALLERGIC needs to be avoided; instead the term SENSITIZED needs to be used. Always report on the positive and negativie controls.

Suggested Reading

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