Allergy Skin Testing Techniques

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Who should be skin tested?

- Significant allergy symptoms that are not optimally controlled with "conservative" pharmacologic therapy and the offending allergens could not be identified through the:
  - medical history,
  - environmental manipulation,
  - dietary elimination-challenge.
- Screening for persistent drug or insect sting allergy.
Allergy Skin Testing

Techniques

- Epicutaneous
- Percutaneous: prick, puncture, (scratch)
- Intradermal (intracutaneous)
- Patch (primarily for type IV)
Percutaneous Skin Testing Procedure

- Verify no antihistaminic medications.
- Cleanse skin.
- Space 1-2 inches apart.
- Apply allergen extracts with appropriate device.
- Include positive (histamine) & negative controls.
- Measure or grade reactions at 15-20 min.
- Check early for histamine response & large reactions.
- Record reactions.
- May apply soothing cream after reading for itching.
Morrow Brown disposable needle
Puncture by bifurcated needle

MAKE A LIGHT PUNCTURE THROUGH A TEST ANTIGEN. THE PUNCTURE SHOULD BE SUFFICIENT TO PENETRATE THE EPIDERMIS BUT NOT SO DEEP THAT YOU DRAW BLOOD.
Multi-Test®

The eight point advantage in skin testing.

Center Laboratories
Division of EM Pharmaceuticals, Inc.
Port Washington, NY 11050
1-800-2-CENTER (1-800-223-6837)
Multi-Test
The sterile, disposable DermaPIK is self-loading and produces epicutaneous punctures of uniform depth and size.
Quanti®-Test System

A control depth skin test device
USP 5749836, 5820562

- Cap for the Quanti-Well to prevent contamination
- Cap shields user from blood borne diseases
- The space occupied by the stopper conserves allergen
- Sharp for detecting specific cytophilic IgE on human Mast Cells
- Stopper: to control the test puncture depth, increasing the test result with reproducible accuracy
- Long finger grip (Sharp-Test)
  large handling plate (Quick-Test)
  are easy to hold
What is the best SPT device?


• No clear advantage of one device over another.
• Optimal results by choosing a device and properly train personnel in its use.
• Reproducible results; CV of 20-30% is reasonable
• Variability between devices:
  – Both positive & negative control sites
  – Multi-devices results in more pain
  – Differences between multi-devices & single devices
  – Intradevice variability with multi-devices
Skin testing is a biologic test that mimics the actual type I reaction.
SPT in a 25-yr-old
AR to cats for many years

Cat

H. dust mix
D. farinae
D. pteryssinus

Grasses
Prick-by-prick using fresh/native food
Intradermal Testing

- Should be preceded by percutaneous testing.
- Limit to suspected allergens that give negative percutaneous reactions.
- Aqueous extracts 1:1000 (or 1:500) w/v.
- High sensitivity (negative predictive accuracy).
Intradermal Testing Procedure

- Use upper arm.
- Use 26 or 27 gauge needle.
- No air in syringe.
- Enter with bevel up & inject with bevel down.
- Space at 1-2 inches apart.
- Inject 0.02 ml (3 mm bleb diameter).
- Read at 10-15 min
Scoring System for Allergy Skin Testing

The wheal & flare response is compared with the responses to diluent & histamine*.

0  Similar to the control (diluent)
1 + Slightly larger than control (by 25-50%)
2 + Definitely larger than control (by > 50%) but smaller than histamine
3+ Similar to histamine (75-125%), wheal has no pseudopods
4 + Larger than histamine (>125%) or the wheal has pseudopods

Histamine 1 mg/ml for percutaneous & 0.1 mg/ml for ID.
(Bahna: Immunol Allergy Clin N Amer 7:299, 1987)
Testing Record

- Physician name, address.
- Patient name, testing date, medications.
- Location of testing (back or arm).
- Method used (prick-puncture, intradermal).
- Device used (prick, puncture).
- E/W measured or scored according to key.
- Include positive & negative controls.
Limitations of Skin Testing

Positive test is not always clinically relevant:
   a. IgE sensitization without clinical relationship.
   b. Irritation by strong extracts or chemical contaminants.

Negative test does not always exclude clinical relevance:
   a. IgE Abs in skin are less than in the shock organ.
   b. Low potency extract.
   c. Poor technique.
   d. Intake of antihistaminic drugs.

Contraindication
   a. Dermographism
   b. Active eczema or other rashes
Approximate Duration of Discontinuation of Common Antihistamines before Allergy Skin Testing

3-6 days for most first generation anti-H1:
e.g., chlorpheniramine, diphenhydramine, ebastine, promethazine, tripelemamine

7-10 days for:
azelastine, cetirizine, clemastine, cyproheptadine, desloratadine, doxepin, fexofenadine, hydroxyzine, ketotifen, loratadine, mequitazine, mizolastine

10-20 days for:
amitriptyline, desipramine, imipramine, nortriptyline
## Skin test positivity to at least 1 allergen in asymptomatic subjects

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>% Positive</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbee</td>
<td>1976</td>
<td>22</td>
<td>Normal subjects</td>
</tr>
<tr>
<td>Curran &amp; Goldman</td>
<td>1961</td>
<td>9</td>
<td>Hospital workers</td>
</tr>
<tr>
<td>Greenberg et al</td>
<td>1970</td>
<td>21</td>
<td>Factory workers</td>
</tr>
<tr>
<td>Hagy &amp; Settipane</td>
<td>1966</td>
<td>17</td>
<td>University students</td>
</tr>
<tr>
<td>Lindbland &amp; Farr</td>
<td>1961</td>
<td>24</td>
<td>Nurses, students, patients</td>
</tr>
<tr>
<td>McNicol &amp; Williams</td>
<td>1969</td>
<td>4, 6, 10</td>
<td>Children 7 yr old, 10 yr old, 14 yr old</td>
</tr>
<tr>
<td>Rhyne et al</td>
<td>1971</td>
<td>3.6, 4.4, 9.7</td>
<td>Ragweed, Grass, Alternaria, Children in Kindergarten</td>
</tr>
</tbody>
</table>
Intradermal Testing Errors

- Tests too close to each other.
- Volume injected too large or not constant for each.
- Concentration too strong.
- Subcutaneous injection instead of ID.
- Intracutaneous bruise misread as positive test.
- Too many tests performed at same time.
- False positive with splash reaction from air.
In conclusion,

- Skin testing is the most commonly used procedure to identify the offending allergen.
- It is biologic, mimics type I reaction.
- ID should be preceded by a negative SPT.
- SPT has high positive predictive value.
- ID has high negative predictive value.
- Requires skill in performing & interpretation.
- There is a need for more standardized extracts.