Skin Testing
Potential Side Effects

Sandra N. Gonzalez Diaz MD, PhD
FAAAAI, FACAAI, SLAAAI 2010-2012

Head and Professor of
The Regional Center of Allergy and Clinical Immunology
University Hospital, "Dr. Jose Eleuterio Gonzalez"
Monterrey, N.L., Mexico
School of Medicine, U.A.N.L 1977-1983, Monterrey, N.L. Mexico

Internal Medicine Specialty, University Hospital U.A.N.L. 1986 - 1988, Monterrey, N.L.

Fellowship Pediatric Allergy and Clinical Immunology, U.C.S.D. 1987-1988, University of California, San Diego, USA

Allergy and Clinical Immunology Specialty, University Hospital U.A.N.L. 1988 - 1990, Monterrey, N.L.

Doctor’s Degree in Allergy and Clinical Immunology, University Hospital U.A.N.L. 1991 – 1997, Monterrey, N.L.

Director of the Allergy and Clinical Immunology Training Program, Centro Regional de Alergia e Inmunología Clínica, Hospital Universitario de Monterrey, since 1990.

Professor, Centro Regional de Alergia e Inmunología Clínica, Hospital Universitario de Monterrey, since 1990.

Head of Centro Regional de Alergia e Inmunología Clínica, Hospital Universitario, Monterrey, N.L. since March 2000 – up to date

Past President of the Mexican College of Clinical Immunology and Allergy (CMICA) -2005-2007

Director of the Department of Funds Raising of the University Hospital, January 2007 - up to date

President of UNASMA (International Asthma Foundation) 2007 – 2011

Director of the Institute of Clinical Immunology, Asthma and Allergy A.C. (NPO)

President elect of the Latin-American Society of Asthma, Allergy and Clinical Immunology (SLAAI) 2010-2012

Past President of the Mesoamerica Chapter of the Latin-American Society of Asthma, Allergy and Clinical Immunology (SLAAI), 1997-1999
Skin testing in allergy diagnosis

Skin testing is the diagnostic cornerstone for allergies

- Is considered extremely safe
- Efficient and
- Rapid method
- May confirm or rule-out the diagnosis of IgE-mediated allergy

Potential side effects of skin tests

- Usually the side effects, if any, are itching and a mildly red skin
- This can last for a couple of hours to a day

Eur J Pediatr. 2010
On rare occasions...

Systemic reactions can occur from skin testing in a highly sensitive individual

Allergic reactions during allergy skin testing

Although very rare, in most patients, occur after Prick to Prick testing.

Anaphylaxis has been described with milk, egg, wheat, or fish P-P testing, during infancy.

Fortunately...

No deaths due to food allergy testing have been reported since 1984.

Those reported until then had occurred following intradermal testing.

Intradermal skin tests with food extracts are not used anymore.
• During the performance of SPT with commercial food extracts had only been reported once, in an adult

• A few cases of allergic reactions to SPT with airborne have also been published

102:400–402
Immediate systemic reactions are more common with **intradermal** than with the prick or puncture tests.

Since 1945, fatal reactions reported that occurred during the application of immunotherapy (40 cases) or skin tests (5 cases) due to **intradermal testing without prior prick tests**.

Prevalence of severe systemic reaction after allergen immunotherapy

- Ranges from less than 1% of patients receiving conventional immunotherapy
- To greater than 36% of patients receiving rush immunotherapy

The estimated fatality rate

- 1 per 2.5 million injections
- Therefore although severe systemic reactions to allergen immunotherapy are not common
- Serious systemic reactions (some fatal) can occur

70% of systemic reactions occur within 30 minutes after an injection

Skin prick tests may give generalized allergic reactions in infants

**OBJECTIVE:** To examine detailed case studies of generalized allergic reactions in connection with skin prick testing in order to identify possible risk factors and thereby increase the safety of the test procedure.

A retrospective study of medical records of six cases with generalized allergic reaction occurring during the study period 1996-1998 at the Pediatric Clinic, University Hospital of Linköping, Sweden.

Data about the total number of children tested during the period were collected from the clinic's database.

Skin prick tests may give generalized allergic reactions in infants

RESULTS

All six cases with generalized reactions were infants <6 months who showed positive skin prick tests to fresh food specimens.

Other common features were active eczema and a family history of allergic disease.

CONCLUSION:
The risk of generalized reactions after skin prick test with fresh food specimens in young children ought to be acknowledged and should lead to increased precautions when performing the test.

The overall rate of generalized reactions was 521 per 100,000 tested children. In the age group <6 months, the corresponding figure was 6,522 per 100,000.

The risk of systemic reactions to skin prick-tests using food allergens: CICBAA data and literature review

Médecine Interne, Immunologie Clinique et Allergologie, Hôpital Central 29, Nancy

The CICBAA1 data, from 1,138 food allergic patients of all ages, cover 34,905 prick-in-prick tests to foods

The risk of systemic reactions can be evaluated at 0.008 %
There were no severe reactions and anti-histamine and corticosteroid therapy were sufficient

The authors draw attention to the necessary precautions: temporary contra-indication for skin prick-tests in children and adults with grade 3 or 4 asthma, with particular attention to such foods as all kinds of nuts, fish, etc.

Report the first two pediatric cases of systemic allergic reactions during skin prick tests (SPT) with commercial food allergens

Anaphylaxis appears to be a rare side effect of skin testing in pediatric patients. Children with a history of asthma and atopic dermatitis are more likely to react.
Recommendations to reduce the risk of systemic reactions

1. The prick method is to precede the application of intradermal tests
2. Avoid foods intradermal testing
3. Exclude the use of beta blockers
4. Caution in infants with eczema who underwent prick tests with fresh foods
5. Have the training to recognize early symptoms and anaphylaxis
6. Have emergency equipment
Signs and symptoms of anaphylaxis

### TABLE E.1. Frequency of occurrence of signs and symptoms of anaphylaxis*

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutaneous</td>
<td></td>
</tr>
<tr>
<td>Urticaria and angioedema</td>
<td>85-90</td>
</tr>
<tr>
<td>Flushing</td>
<td>45-55</td>
</tr>
<tr>
<td>Pruritus without rash</td>
<td>2-5</td>
</tr>
<tr>
<td>Respiratory</td>
<td></td>
</tr>
<tr>
<td>Dyspnea, wheeze</td>
<td>45-50</td>
</tr>
<tr>
<td>Upper airway angioedema</td>
<td>50-60</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>15-20</td>
</tr>
<tr>
<td>Dizziness, syncope, hypotension</td>
<td>30-35</td>
</tr>
<tr>
<td>Abdominal</td>
<td></td>
</tr>
<tr>
<td>Nausea, vomiting, diarrhea, cramping</td>
<td>25-30</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>5-8</td>
</tr>
<tr>
<td>Substernal pain</td>
<td>4-6</td>
</tr>
<tr>
<td>Seizure</td>
<td>1-2</td>
</tr>
</tbody>
</table>

### Recommended equipment and medications to treat anaphylaxis

Adequate equipment and medications should be immediately available to treat anaphylaxis, should it occur. This should include at least the following equipment and medications:

- stethoscope and sphygmomanometer;
- tourniquet, syringes, hypodermic needles, and large-bore needles (14-gauge);
- aqueous epinephrine HCl 1:1000 wt/vol;
- equipment to administer oxygen by mask.
- intravenous fluid set-up;
- antihistamine for injection (second-line agents for anaphylaxis, but H₁ and H₂ antihistamines work better together than either one alone);
- corticosteroids for intravenous injection;
- vasopressor;
- equipment to maintain an airway appropriate for the supervising physician’s expertise and skill.

---

**Anaphylaxis: Recent advances in assessment and treatment**

F. Estelle R. Simons, MD, FRCPC, FAAAAI

Winnipeg, Manitoba, Canada, *J ALLERGY CLIN IMMUNOL* OCTOBER 2009
VARIABLES THAT MAY AFFECT THE SKIN TEST REACTIVITY

- **Age**
  Reactivity decreases with age, peaks at the end of adolescence and the beginning of the 20s, then declines with time after 65 years

VARIABLES THAT MAY AFFECT THE SKIN TEST REACTIVITY

- **Histamine sensitivity**
  - Inherent innate sensitivity may increase or decrease the reactivity of the skin test

- **Body location**
  - Upper vs lower back and arm vs back, can vary with the device

---

VARIABLES THAT MAY AFFECT THE SKIN TEST REACTIVITY

- Skin tests should not be conducted in areas with severe dermatitis or dermographism
- Damage caused by the sun on the skin
  - Affects the number of mast cell and may explain the loss of skin test reactivity with aging and decreased IgE with age
- Other diseases
  - may suppress skin test reactivity: Skin cancer, Chronic renal failure, diabetic neuropathy, immunosuppressed

VARIABLES THAT MAY AFFECT THE SKIN TEST REACTIVITY

- **Chronobiology**
- Circadian rhythms and annual variability

VARIABLES THAT MAY AFFECT THE SKIN TEST REACTIVITY

• **Allergen immunotherapy**
  – Immunotherapy effectively decrease the skin test reactivity to allergens treated

• **Allergen extract quality**
  – Weak extracts can produce false negative results

VARIABLES THAT MAY AFFECT THE SKIN TEST REACTIVITY

- **Near the positive control to other allergens**
  - When placing an allergen extract near a strongly positive allergen extract can produce false positive results

- **Medications**
  - Some can increase (eg B-blockers) and
  - Others may decrease the skin test reactivity (eg, antihistamines, tricyclic antidepressants)

TABLE 10: Inhibitory effects of treatments on IgE-mediated allergic reactions

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Degree</th>
<th>Duration</th>
<th>Clinical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1-antihistamines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>astemizole*</td>
<td>+++</td>
<td>30-60 days</td>
<td>yes</td>
</tr>
<tr>
<td>azelastine oral</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>cetirizine</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>chlorpheniramine</td>
<td>++</td>
<td>1-3 days</td>
<td>yes</td>
</tr>
<tr>
<td>clemastine</td>
<td>+++</td>
<td>1-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>ebastine</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>fexofenadine</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>hydroxyzine</td>
<td>+++</td>
<td>1-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>ketotifen</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>loratadine</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>mequitazine</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>mizolastine</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>oxatamide</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>terfenadine*</td>
<td>+++</td>
<td>3-10 days</td>
<td>yes</td>
</tr>
<tr>
<td>H2-antihistamines</td>
<td>0 to +</td>
<td>&gt;10 days</td>
<td>no</td>
</tr>
<tr>
<td>imipramines</td>
<td>+++</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>corticosteroids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>oral/IM short term</td>
<td>0</td>
<td></td>
<td>unlikely</td>
</tr>
<tr>
<td>IM long term</td>
<td>possible</td>
<td></td>
<td>unlikely</td>
</tr>
<tr>
<td>intranasal</td>
<td>0</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>intra-bronchial</td>
<td>0</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>topical skin</td>
<td>0 to ++</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>theophylline</td>
<td>0 to +</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>chromones</td>
<td>0</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>β2-agonists</td>
<td>0 to +</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>inhaled</td>
<td>0 to +</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>systemic</td>
<td>0 to ++</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>dopamine</td>
<td>+</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>clonidine</td>
<td>++</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>specific immunotherapy</td>
<td>0 to ++</td>
<td></td>
<td>no</td>
</tr>
</tbody>
</table>

We look forward to welcoming you to the 2011 World Allergy Congress

Deseamos darte la bienvenida al Congreso Mundial de Alergía 2011

CANCÚN, MÉXICO

4-8 December 2011

www.worldallergy.org/wac2011

A meeting of the World Allergy Organization in collaboration with Compedia and CMICA