TESTING FOR FOOD ALLERGIES

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Objectives

• Understand what blood tests (RAST) and skin tests are measuring
• Learn what the size of a positive skin test really means
• Know what the level of RAST means
• Understand the role of food challenges
• Learn when re-testing is appropriate
IgE (Allergic Protein)
Allergic Reaction

**Immediate Release**
Granule contents:
- Histamine
- TNF-α
- Proteases
- Heparin

- Sneezing
- Nasal congestion
- Itchy, runny nose
- Watery eyes

**Over Minutes**
- Lipid mediators:
  - Prostaglandins
  - Leukotrienes
- Wheezing
- Bronchoconstriction

**Over Hours**
- Cytokine production:
  - Specifically IL-4, IL-13
- Mucus production
- Eosinophil recruitment
RAST Testing

• RAST test measures the amount of IgE protein for a specific food that you have in your blood
• Does not tell you if that IgE protein is capable of causing a reaction
RAST Testing

- In general a negative RAST test is very good in ruling out a food allergy.
- Greater than 50% of the time a positive test is not of any clinical significance.
  - Chance that it is significant depends on the food being tested and the level of the RAST.
RAST Testing

- RAST tests are often expressed in several ways
- Class 1 - 6 is not useful
  - arbitrary classification by labs
- Need to look at the levels expressed as KU/L
Positive Predictive Values (PPV) and Negative Predictive Values (NPV)

- PPV - chance that you are allergic with a RAST at this level
  - 95% PPV means there is a 95% chance you are allergic at this level

- NPV - chance that you are not allergic with this level of RAST
  - 95% NPV means there is a 95% chance that you are not allergic at this level
<table>
<thead>
<tr>
<th></th>
<th>95% NPV</th>
<th>95% PPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>0.8</td>
<td>32</td>
</tr>
<tr>
<td>Egg</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Wheat</td>
<td>5</td>
<td>75% at 100</td>
</tr>
<tr>
<td>Soy</td>
<td>2</td>
<td>50% at 65</td>
</tr>
<tr>
<td>Peanut</td>
<td>85% at 0.35</td>
<td>15</td>
</tr>
</tbody>
</table>
RAST Testing

- IgE level does not correlate with threshold dose for reaction
  - Can have reaction with minute exposure even with very low RAST

- Level of RAST indicates probability of reaction not severity
  - Can have severe reaction even with very low RAST
Skin Testing

• Skin testing is looking for IgE to a specific food but also the ability of that IgE to cause a clinical reaction

• In general a negative skin test is very good in ruling out a food allergy (>95%)
  – except in children under 1 year
Skin Testing

• 30% of the time a positive skin test is not of any clinical significance
  – depends on food being tested and the size of the reaction
  – many people will get small nonspecific reactions to many or all foods
    • can be due to sensitive skin
Skin Testing

• Size of wheal indicates probability of reaction not severity
  – Can have severe reaction with a small skin test or a very mild reaction with a large one
Wheal Diameters 100% Diagnostic Of Food Allergy

<table>
<thead>
<tr>
<th>If Allergic to:</th>
<th>Risk of Reaction to at Least One:</th>
<th>Risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A legume*</td>
<td>Other legumes</td>
<td>5%</td>
</tr>
<tr>
<td>peanut</td>
<td>peas, lentils, beans</td>
<td></td>
</tr>
<tr>
<td>A tree nut</td>
<td>Other tree nuts</td>
<td>37%</td>
</tr>
<tr>
<td>walnut</td>
<td>brazil, cashew, hazelnut</td>
<td></td>
</tr>
<tr>
<td>A fish*</td>
<td>Other fish</td>
<td>50%</td>
</tr>
<tr>
<td>salmon</td>
<td>swordfish, sole</td>
<td></td>
</tr>
<tr>
<td>A shellfish</td>
<td>Other shellfish</td>
<td>75%</td>
</tr>
<tr>
<td>shrimp</td>
<td>crab, lobster</td>
<td></td>
</tr>
<tr>
<td>A grain*</td>
<td>Other grains</td>
<td>20%</td>
</tr>
<tr>
<td>wheat</td>
<td>barley, rye</td>
<td></td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Beef</td>
<td>10%</td>
</tr>
<tr>
<td>wheat</td>
<td>hamburger</td>
<td></td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Goat's milk</td>
<td>92%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>goat</td>
<td></td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Mare's milk</td>
<td>4%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>horse</td>
<td></td>
</tr>
<tr>
<td>Pollen</td>
<td>Fruits/vegetables</td>
<td>55%</td>
</tr>
<tr>
<td>birch, ragweed</td>
<td>apple, peach, honeydew</td>
<td></td>
</tr>
<tr>
<td>Peach*</td>
<td>Other Rosaceae</td>
<td>55%</td>
</tr>
<tr>
<td>apple, plum, pear</td>
<td>cherry</td>
<td></td>
</tr>
<tr>
<td>Melon*</td>
<td>Other fruits</td>
<td>92%</td>
</tr>
<tr>
<td>cantaloupe</td>
<td>banana, avocado</td>
<td></td>
</tr>
<tr>
<td>Latex*</td>
<td>Fruits</td>
<td>35%</td>
</tr>
<tr>
<td>latex glove</td>
<td>kiwi, banana</td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>Latex</td>
<td>11%</td>
</tr>
<tr>
<td>banana, avocado</td>
<td>latex glove</td>
<td></td>
</tr>
<tr>
<td>Latex</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Food Challenges

• Gold standard for determining food allergies
• Given tiny amount of the food in question and observed for 20 minutes
  – If no reaction amount is doubled every 20 minutes until a full portion of the food has been eaten
• Usually takes 2.5 - 4 hours
Natural History

• Milk tolerance
  – 56% by 12 months
  – 77% by 24 months
  – 87% by 3 years

• Egg tolerance
  – 50% by 2 years
  – 75% by 3 years

• Peanut tolerance
  – 20% outgrow by 5-6 years
Follow-Up

• Re-evaluate for tolerance periodically
• Interval and decision to re-challenge:
  – Type of food allergy
  – Severity of previous symptoms
• Milk, egg, soy, wheat - retest yearly
• Peanut - retest yearly till 6 then every 2-3 years
Follow-up

• Skin prick test/RAST may remain positive even though the child has outgrown the allergy
• Amount the RAST declines may be more predictive of having outgrown the allergy than the level itself
Peanut Allergy

- 8% recurrence in people who have outgrown their allergy
- Recurrence higher in those who continue to avoid peanuts or who do not eat them regularly
- Recommended to eat peanuts several times per month and carry adrenaline for 1 year
- If avoiding carry adrenaline indefinitely
Take Home Messages

• A negative skin test and RAST test is good for ruling out a food allergy

• A positive skin test or RAST test does not mean you are truly allergic to that food

• The size of the skin test or RAST test tells you how likely you are to be allergic
  – does not tell you what the severity of the reaction will be or at what dose you will have a reaction
Take Home Messages

- Often foods in the same family will be positive on skin test or RAST but you are not necessarily truly allergic
- Food challenge is only definitive test
- Recurrence of peanut allergy can happen