Oral Food Challenges
What, Where, When and Why

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I do not have any financial disclosure to report
Why Challenge?

- To confirm that the suspected food is the cause of an allergic reaction

- To determine if an allergy to a specific food has been outgrown
Take an Accurate History

1. Description of signs and symptoms
2. Timing from ingestion to onset of symptoms
3. Frequency with which reactions have occurred
4. Timing of most recent occurrence
5. Quantity of food required to provoke a reaction
Take an Accurate History

6. Associated factors (activity, other food)
7. Be sure to obtain details for each food
8. Often patients/parents report all reactions as the same – get the details!
Challenge Goals

- To determine if symptoms can be reproduced
- To reproduce the symptoms as described in the history
- To determine the dose causing symptoms
- To confirm food allergy
Office Challenge

- Anaphylaxis should not be deliberately challenged in the office, but you should be prepared to treat it if it occurs.

- Allergists and staff equipped to treat injection reactions can treat food reactions.
Office Challenges

- What is the probability of a reaction?
- What is the likely severity?
- What is the timing suggested by the history?
- Are the symptoms objective or subjective?
Office Challenges

The more subjective the symptoms, the more blind the challenge needs to be
Which Challenge To Do?

• Open Challenge
  • Excellent screen for food allergy
  • Suspected food is eaten in “normal serving” amount while under observation
  • Easy to do, not time consuming
  • Open to bias by the patient and the observer
Which Challenge To Do?

- Single-blind Challenge
  - Suspected food is hidden in either a food known to be safe, or in capsules
  - The patient is not told what food is being challenged
  - Requires more preparation
  - Reduces bias in evaluation of the challenge
Which Challenge To Do?

- Double-blind, Placebo-controlled Challenge
  - Patient and staff administering the challenge are blinded
  - Requires more preparation
  - Bias is eliminated
  - Is considered to be the “gold standard” in diagnosis of food allergy
  - Used most often in research studies
Patient/Family Preparation

- Describe the procedure
  - NPO for two hours prior to challenge
  - No antihistamine use for 4-7 days prior to challenge
  - No short acting bronchodilators the morning of the challenge
- Provide reassurance to both the child and the family
The Office Setting - What to Consider

- Open Challenges more efficient
- Appropriate for patient/family to provide food for challenge
- Supplies may be necessary
  - microwave
  - measuring cups
  - plastic plates, utensils
  - gram scale
The Office Setting - What to Consider

- Thorough assessment prior to challenge
  - Skin - hives, active eczema
  - Respiratory - wheezing, cough, sore throat
  - GI - complaint of abdominal symptoms
- Challenge may be deferred for any illness or symptoms that could mask a reaction
The Office Setting - What to Consider

- Emergency Medications
  - Oral antihistamine -- consider having dye free form available to those who report dye allergy
  - Epinephrine
  - Albuterol and nebulizer
  - Steroids
# Emergency Medications

## Food Challenge Flow Sheet

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Concentration</th>
<th>Usual Dosage</th>
<th>Calculated Dosage (mg)</th>
<th>Volume (ml)</th>
<th>Max Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benadryl PO</td>
<td>12.5mg/5ml</td>
<td>1.5mg/kg</td>
<td>32.0</td>
<td>12.8</td>
<td>50mg</td>
</tr>
<tr>
<td>Benadryl IV</td>
<td>50mg/1ml</td>
<td>1mg/kg</td>
<td>21.4</td>
<td>0.43</td>
<td>50mg</td>
</tr>
<tr>
<td>Solumedrol IV</td>
<td>40mg/ml</td>
<td>2mg/kg</td>
<td>42.7</td>
<td>11.1</td>
<td>100mg</td>
</tr>
<tr>
<td>Solucortef IV</td>
<td>50mg/ml</td>
<td>5mg/kg</td>
<td>106.8</td>
<td>2.1</td>
<td>240 mg</td>
</tr>
<tr>
<td>Prednisone</td>
<td>5mg/ml</td>
<td>1mg/kg</td>
<td>21.4</td>
<td>4.3</td>
<td>60 mg</td>
</tr>
<tr>
<td>Ranitidine PO</td>
<td>15mg/ml</td>
<td>4mg/kg</td>
<td>85.5</td>
<td>0.0</td>
<td>300 mg</td>
</tr>
<tr>
<td>Epinephrine IM</td>
<td>1:1000</td>
<td>0.01ml/kg</td>
<td></td>
<td>0.21</td>
<td>0.3ml</td>
</tr>
<tr>
<td>Zyrtec</td>
<td>1mg/ml</td>
<td>Age Based</td>
<td></td>
<td>5</td>
<td>10 mg</td>
</tr>
</tbody>
</table>

## Flowsheet

<table>
<thead>
<tr>
<th>Time</th>
<th>Dose</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Office Setting - What to Consider

- Administration of the challenge
  - In some instances food is weighed/measured - other times estimating amount is acceptable
The Office Setting - What to Consider

- Administration of the challenge
  - Food is eaten in small amounts at 10-15 minute intervals to allow for observation
  - Observe closely after completion of the challenge
The Office Setting - What to Consider

- **Staffing**
  - Who is responsible for administering the challenge and observing the patient?
  - In the event of a serious reaction, who is assigned to monitor the patient while maintaining routine office activities?
Helpful Hints for Open OFC

• Parent will need to bring challenge food with them to the office.

• Multiple options are helpful to ensure cooperation by the child.
  • Example bring both French toast and scrambled egg
  • Products to help mask food
  • Entertainment
Challenge Substances
Baked Egg and Baked Milk Challenges

Serving size: 1 muffin

- Parents are instructed to prepare muffins according to recipe provided by the office and to bring them to the clinic on the challenge day.
- One baked egg muffin contains 1/3 of one egg (~2 grams of protein)
- One baked milk muffin contains ~1.3 ounce of milk (1.3g protein)
Egg muffins

Yield – 6 muffins (1/3 egg per muffin)

1 cup flour (or flour substitute)
¼ tsp salt
2 tbs of rice milk (or soy milk, cow’s milk, almond milk)
1 tsp baking powder
¼ tsp cinnamon
2 eggs
½ cup sugar
¼ cup corn oil
½ tsp vanilla
1 cup ripe banana or apple

Preheat oven 350 degrees F, combine dry ingredients and mix with wet ingredients. Pour in muffin cups and bake for 30 minutes.

Milk Muffins

Yield: 6 muffins

Ingredients:
1 cup of Milk
2 Tbsp. canola oil
1 tsp. vanilla extract
1 Egg or 1 ½ tsp. Egg replacer (Note: We use Ener-G brand egg replacer.)
1 ¼ cup of flour
½ cup sugar
¼ tsp. salt
2 tsp. baking powder

Preheat oven 350 degrees F, combine dry ingredients and mix with wet ingredients. Pour in muffin cups and bake for 30-35 minutes.
Baked Egg and Baked Milk Challenges

- Dose #1- 1/8 muffin
- Dose #2- 1/8 muffin
- Dose #3- ¼ muffin
- Dose #4- ½ muffin

Each dose is separated by 15 minutes of observation.

Other options for baked egg and baked milk challenges are standard cake or cookie mixes which are prepared with either one cup milk or with 3 eggs.
Passing Baked Milk/Egg Challenges: What’s next?

- Patient can eat store bought products with egg/milk listed as the 3rd ingredient or further.
  - Home baked products that have 1 cup milk per 1 cup flour or 1 cup milk per batch of 6
  - Home baked products that have 1 egg per 1 cup flour or 1-2 egg per batch of a recipe (yield 6 servings).
- If you offer home-baked products, please feed 1 serving at a time
- Less-baked milk challenges: Pizza challenge
Survey Study Results

Jay Lieberman

- 701 open food challenges completed
- 18.8% of the patient elicited a reaction
- 87.9% of reactions only required antihistamine
- 1.6% of patients required epinephrine
Hospital Challenges

- Suggested for challenges with increased risk
- Good setting for DBPCFC
  - more time and staff available
  - challenge can be given very slowly, staff can observe for several hours
  - dietary staff to prepare challenge to assure blinding of staff and patient
Challenge Administration Schedule

<table>
<thead>
<tr>
<th>TIME</th>
<th>DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>:00</td>
<td>1%</td>
</tr>
<tr>
<td>:05</td>
<td>4%</td>
</tr>
<tr>
<td>:20</td>
<td>10%</td>
</tr>
<tr>
<td>:35</td>
<td>20%</td>
</tr>
<tr>
<td>:50</td>
<td>20%</td>
</tr>
<tr>
<td>:60</td>
<td>20%</td>
</tr>
<tr>
<td>:70</td>
<td>25%</td>
</tr>
</tbody>
</table>
Emergency Medications

Medications are readily available throughout the challenge:

- antihistamine, oral and IV
- epinephrine
- corticosteroids
- inhaled β-agonist
- type-2 histamine blocker
- IV fluid
Emergency Medications
Stopping the Challenge

Subjective symptoms
- Anxiety
- Can the patient be distracted -- provide activities for children

Complaints of oral/throat symptoms
- observe closely for signs such as mouth movements, throat clearing, rubbing ears
- offer sips of water to observe swallowing
Stopping the Challenge

- The challenge is stopped when the nurse or physician monitoring the challenge is convinced that they are seeing signs of allergic reaction
- Medicate to treat the reaction
Parental Persuasion

- “He always does this – I never give medicine”
- Does he really need medicine?
- Are you sure he is reacting?
- Can’t we finish the challenge?
Stopping the Challenge

- Challenge completed without symptoms
- Symptoms of allergic reaction
  - Objective symptoms
    - hives
    - swelling
    - eczema flare
    - respiratory symptoms -- wheeze,
Negative Challenge

- No longer need to avoid the food
- Continued resistance to eating the food
- Fear of re-developing the allergy
Psycho-Social Concerns

Negative Challenge

- Losing identity
- Fear of no longer being special
- Continued fear about food allergy
Positive Challenge

- Re-enforces the need to restrict the food
- Provided opportunity for further education
  - Understanding the signs and symptoms of a food-induced allergic reaction
  - Demonstrates the necessity of carrying medications and having an emergency treatment plan
Psycho-Social Concerns
Positive Challenge

• Feelings of failure
• Anger about the allergy
• Fearing that the allergy will never resolve
THANK YOU!