Food Allergy

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Food

• Basic nutrients (fats, carbohydrates, proteins)
• Vasoactive amines
• Histamine liberators
• Toxic products of contaminating bacteria, molds
• Antibiotics
• Spices
• Food additives: Flavorings, Coloring, preservatives

Food Allergy

- Immunological response

Food Intolerance

- A reproducible adverse reaction to a specific food or food ingredient

Food Allergen

- Heat-, acid-, enzyme-resistant glycoprotein (18-36 kd)
- Unaltered by the digestive enzymes in mouth, stomach, intestines
- Unaltered by acidic conditions in stomach
- Smaller molecules can also be haptens
- Heating: activate some Ags
- Inactivate some Ags

Factors contribute to food allergy

- Sensitisation
  - Genetic predisposition
  - Immaturity of immune system or GI tract mucosal barrier in newborn infants
  - Dosage of Ag
  - Certain food Ag are likely to lead to sensitisation
  - A trigger event
  - Alteration of GI tract permeability
- Immunological, molecular mechanism
- Heat treatment

Food Allergy

Type I: Immediate Rx
  - Immediate and Late phase Rx
    - Eczema
    - Eo gastroenteritis
Type II: Cytotoxic Rx, thrombocytopenia
  - 2nd to cow milk ingestion
Type III: Immune complex Rx
Type IV: Delayed typed, enteropathy
**Immune defense in normal gut**

1. barrier
2. IgA
3. IgA-Ag complex
4. T-suppressor cells

No Urticaria

**Immune defence in the gut wall of urticarial patients with food allergy**

1. Defective barrier
2. Enhanced absorption
3. Excessive dose of Ag
4. insufficient IgA
5. Enhanced IgE production
6. Decreased Ts Activity

Urticaria

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**Food intolerance (1)**

- **Food allergy**
- **Enzyme defects**: Lactase deficiency
- **Pharmacological mechanisms**
  - Caffeine: stimulant effect
  - Sodium nitrite: bl.vv.dilatation (flush, headache, urticaria)
  - Tyramine, histamine: cheese, alcoholic drinks, sausage, tinned fish etc.

**Food intolerance (2)**

- **Irritant**: coffee, curry
- **Specific drug-food combinations**
  - Tyramine-containing food: Monoamine oxidase inhibitor
  - Alcohol: Disulfiram
- **Toxic mechanisms**
  - Mycotoxins: Mushrooms
- **Food storage**
  - Histamine: badly stored mackerel
  - Ripen fruit: new active glycoprotein

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**Prevalence of food allergy**

- **Children**: 6 - 8%
- **Adult**: 1.5 - 2.5%
- **Finland (866 children: 1-6 yrs)**
  - By the age of 1 yr: 19%
  - 2 yrs: 22%
  - 3 yrs: 27%
  - 6 yrs: 8%

**Clinical features of food allergy**

- **Urticaria, angioedema**
- **Rhinitis**
- **Worsening of pre-existing atopic eczema**
- **Asthma**
- **Vomiting, abdominal pain, diarrhea**
- **Anaphylactic shock**
Cross reactions

1. Between different food species
   - Milk: cow, goat, sheep, horse - marked antigenic similarity
   - Bird eggs: duck eggs contain the major allergens in hens' egg
   - Seafood: The taxonomic diversity - cross reactivity for all seafood is uncommon
   - Legumes: cross-reactivity is uncommon

2. Between foods and non-food items
   - Inhaled pollen
   - Ingested food allergens
     - Apple, carrot, celery, potato, orange, tomato
     - Contactant & ingested food allergen: Latex, Nickel

Seafood classification

<table>
<thead>
<tr>
<th>PHYLLUM</th>
<th>CLASS</th>
<th>COMMON NAME</th>
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<tbody>
<tr>
<td>Molluscs</td>
<td>Gastropods</td>
<td>Snails, Abalone</td>
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<tr>
<td></td>
<td>Bivalves</td>
<td>Clam, Mussel, Oyster</td>
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<tr>
<td></td>
<td>Cephalopods</td>
<td>Octopus, Squid, Scallop</td>
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<tr>
<td>Arthropods</td>
<td>Crustaceae*</td>
<td>Crab, Lobster, Shrimp</td>
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<td></td>
<td></td>
<td>Prawn, Crayfish</td>
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<tr>
<td>Chordates</td>
<td>Cartilagenous fish</td>
<td>Ray, Shark</td>
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<tr>
<td></td>
<td>Bony fish</td>
<td>Cod, Salmon, Tuna etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If Allergic to:</th>
<th>Risk of Reaction to at Least One:</th>
<th>Risk:</th>
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<tbody>
<tr>
<td>Cow's milk*</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Pollen bron</td>
<td></td>
<td>55%</td>
</tr>
<tr>
<td>Peach*</td>
<td></td>
<td>92%</td>
</tr>
<tr>
<td>Melon*</td>
<td></td>
<td>11%</td>
</tr>
<tr>
<td>Latex*</td>
<td></td>
<td>35%</td>
</tr>
<tr>
<td>Other Fruits</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td>Other Rosaceae</td>
<td></td>
<td>55%</td>
</tr>
<tr>
<td>Fruits/vegetables</td>
<td></td>
<td>55%</td>
</tr>
<tr>
<td>Mare's milk</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Horse</td>
<td></td>
<td>2%</td>
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</tbody>
</table>

Foods high in Nickel

- Asparagus
- Oysters
- Tea
- Baking powder
- Peanuts
- Tomatoes
- Beans
- Pears
- Wholemeal flour
- Cabbage
- Peas
- All canned food
- Corn
- Raisins
- All food cooked in
- Cocoa
- Rhubarb
- Nickel utensils
- Herrings
- Spinach
- Mushrooms
- Sprouts
Gluten

: is a substance found in
- Wheat
- Rye
- Barley
- Oats

Bread, cakes, biscuits

Timing of allergic reaction

- Most allergic reactions to foods occur within minutes of ingestion
- Sometimes: delayed
  - Cow's milk protein allergy
    - Early skin Rx: within 45 min
    - Early gut Rx: between 45 min to 20 hrs
    - Late Rx: develop at ~ 20 hrs

Quantity of food required for allergic Rx

- varies
- relationship between the quantity of food required and the onset of symptoms

Other factors required for an allergic Rx to occur

- Food-dependent exercise-induced anaphylaxis: celery, shellfish, squid, peaches, wheat
- Effect of disease activity: can tolerate some or all food triggers when the skin disease (eczema) clear
- Drug-dependent food allergy: only react to foods while taking salicylate

Diagnosis of food allergy

1. Hx: Speed of onset (the quicker, the more reliable)
   - Exclude co-occurring incidences
   - Reproducible
2. PE
3. Tests: Lack of simple reliable tests
   3.1 Skin prick test
   3.2 RAST blood test
4. Oral food challenge (Open, DBPC)
   - Many adverse Rx to food are not IgE-mediated
Food Allergy

**Food SPT**

- Have a very high negative predictive value for immediate hypersensitivity
- But a very low positive predictive value (<50% compared to DBPCFC)
- Negative SPT (or RAST test) predicts with about 97% accuracy that the test food was not the cause of symptoms
- No predictive role in other food reaction; food additives

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**SPT vs RAST test**

- Both tests measure the same things
- RAST test have no advantage over SPT
- Combining the results of both tests does not increase accuracy

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**Mechanisms of foods that cause urticaria**

- IgE-mediated: fish, shellfish, milk, nuts
- Histamine liberators: egg white, cheese, strawberry
- Vasoactive amines: cheese, beer, sausage
- Others: azo dyes, benzoic acid
**Food Allergy & Urticaria**

- Food allergy: acute urticaria
- Role of food in chronic urticaria: controversial
- Mathews 1983: As a cause for CU/angioedema: food allergy can only be rarely implicated

- Greaves: Routine use of placebo-controlled single-blind challenge testing for food additive intolerance (>20 yrs)
  - patients who can reproducibly be shown to react to a food additive are extremely rare

**Food-Elimination Diet**

- หยุดอาหารที่สงสัย 3 สัปดาห์ โดยไม่กินยา
- strong support evidence: อาการหาย ร่วมกับ positive SPT

**Food-Elimination Diet**

- ให้ hypoallergenic food เช่น ข้าว หมู ไข่ ปู โปรตีนสกัดละเอียด
  (หลีกเลี่ยง ผงชูรส ซีอิ่ว น้ำปลา) เป็นเวลา 1 สัปดาห์ โดยไม่กินยา
- ถ้าลมพิษไม่ขึ้น ให้เพิ่มอาหารที่สงสัยทีละตัว โดยกาลเวลาได้ 1 สัปดาห์

**Natural Hx of food allergy**

- A high proportion of children with food intolerance in 1st yr of life lose their tolerance in time
- Common for allergy to cow’s milk or egg to disappear with time (peanut : life-long)
- Adult: more likely to be life-long
  - some, become tolerant to foods to which they were allergic
  - 1/3, lose their allergy after elimination diet for 1 yr

**Are you hungry?**

- Image of a bowl of soup.