# Update on eczema and food allergy

Associate Professor Rohan Ameratunga

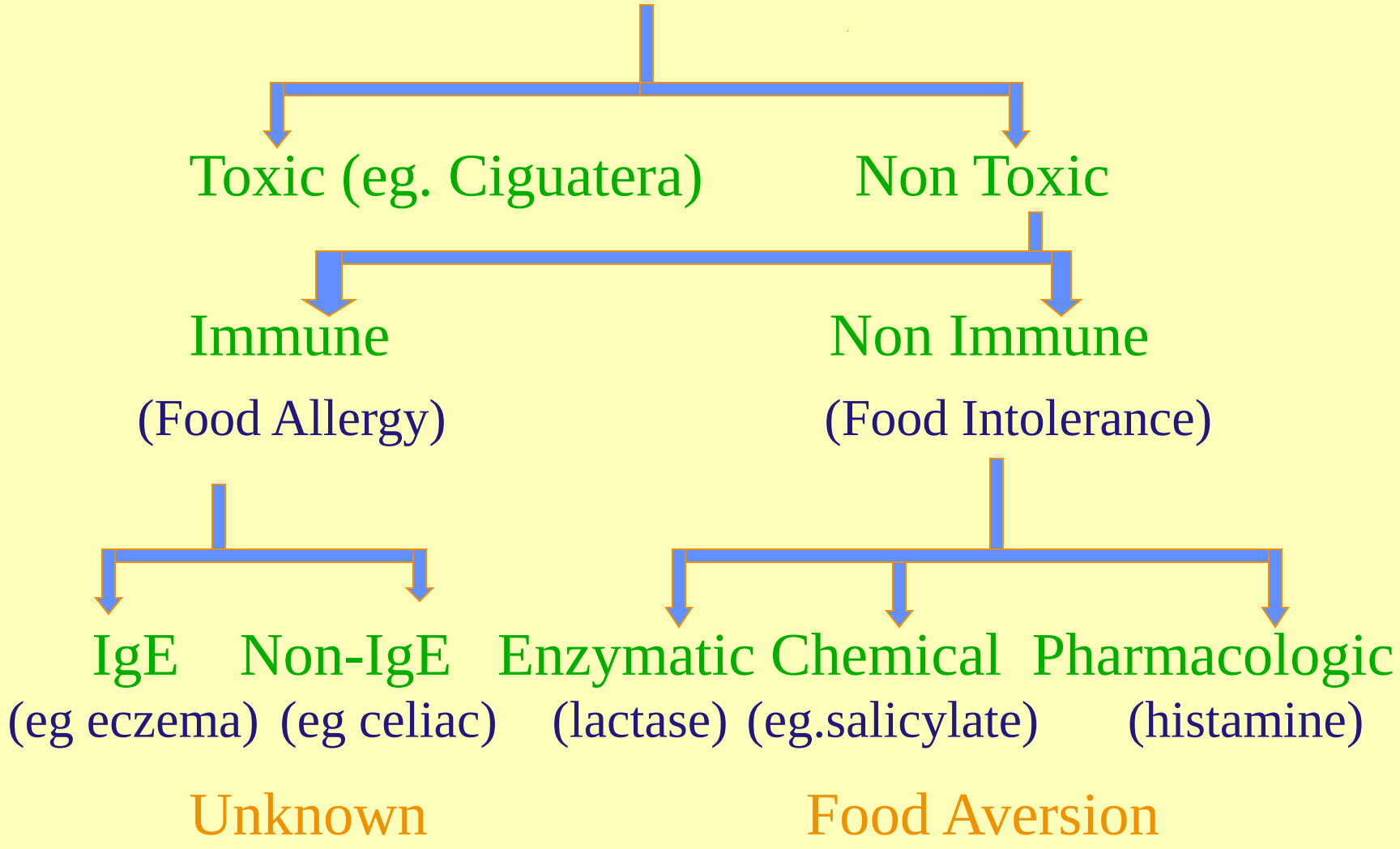
# Case history (type 1 reaction)

- Emma aged 18 months
- Ate peanut butter
- Within 5 minutes developed hives, angioedema and breathing difficulty
- How should anaphylaxis be treated?
- What is her long term management?
- What other measures should be undertaken?

# Update on food allergy

- Epidemiology
- Food allergen update incl cross-reactivity
- Diagnosis including testing
- Type 1 reactions incl anaphylaxis
- Other selected syndromes-exercise, eczema
- Prevention of food allergy

# Adverse Reactions to Food

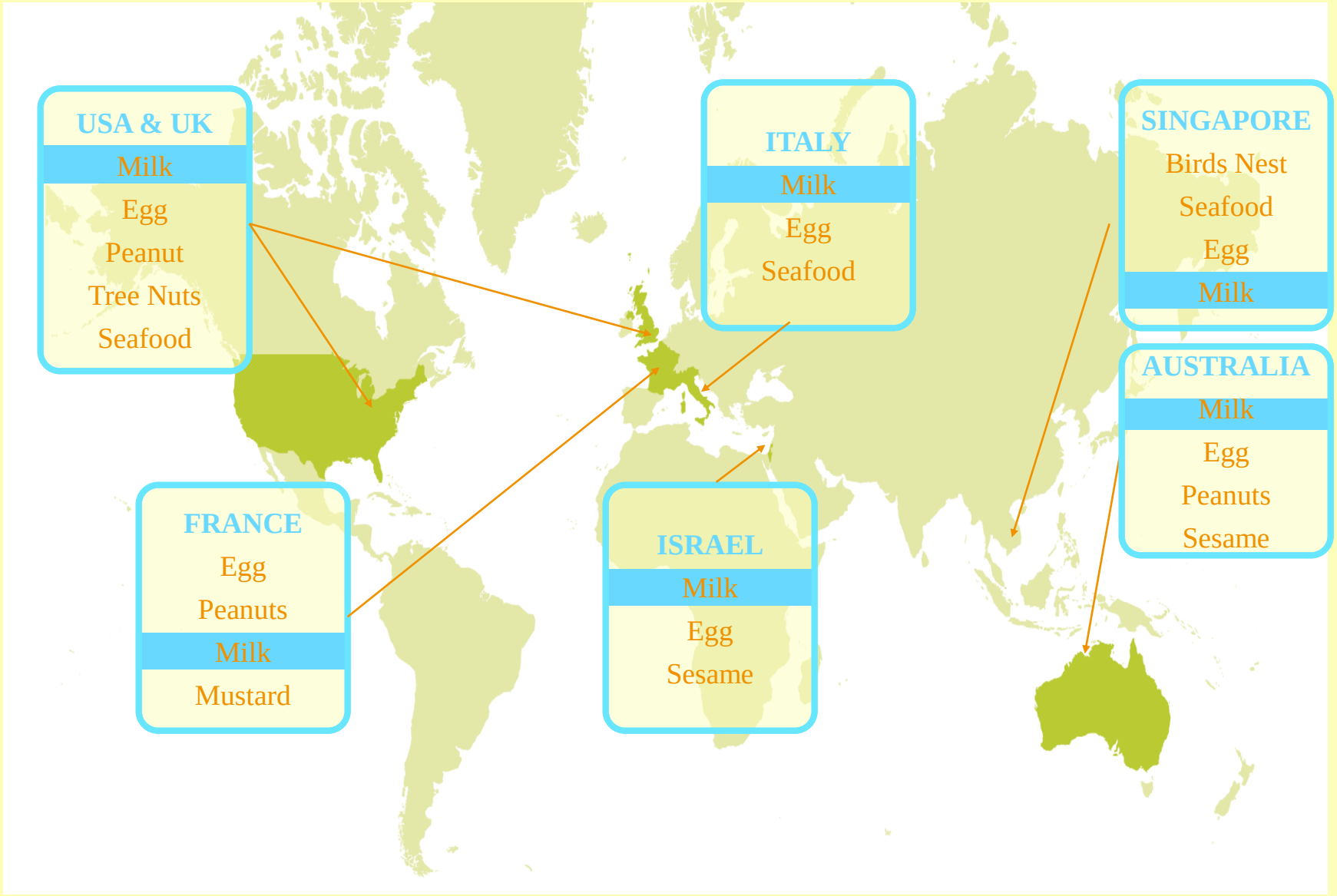


# Epidemiology of food allergy

- 20% to 25% of American public report being allergic to one or more foods - most such beliefs are incorrect
- Careful studies, with oral challenge, demonstrate food allergy in 2% to 4.0% of the population
- Prevalence higher in children
- 2.3% adolescents in Isle of Wight (0.9% peanut)
- This is consistent with data from around the world.
- Our data suggests similar patterns
- Increase in food allergy over the last 20 years
- Patterns of food allergy changing with migration and changes in diet

# Food allergens

- When food allergy is confirmed, it usually proves to be restricted to 1 or 2 foods
- Young children: milk, egg, peanut, tree nuts, soy, and wheat account for about 90% of cases
- Adolescents and adults: peanut, fish, shellfish, and tree nuts account for about 85%
- Cultural variation eg rice in Japan, increasing sesame allergy in NZ and Australia
- Newly recognized allergens incl Anisakis, Lupin

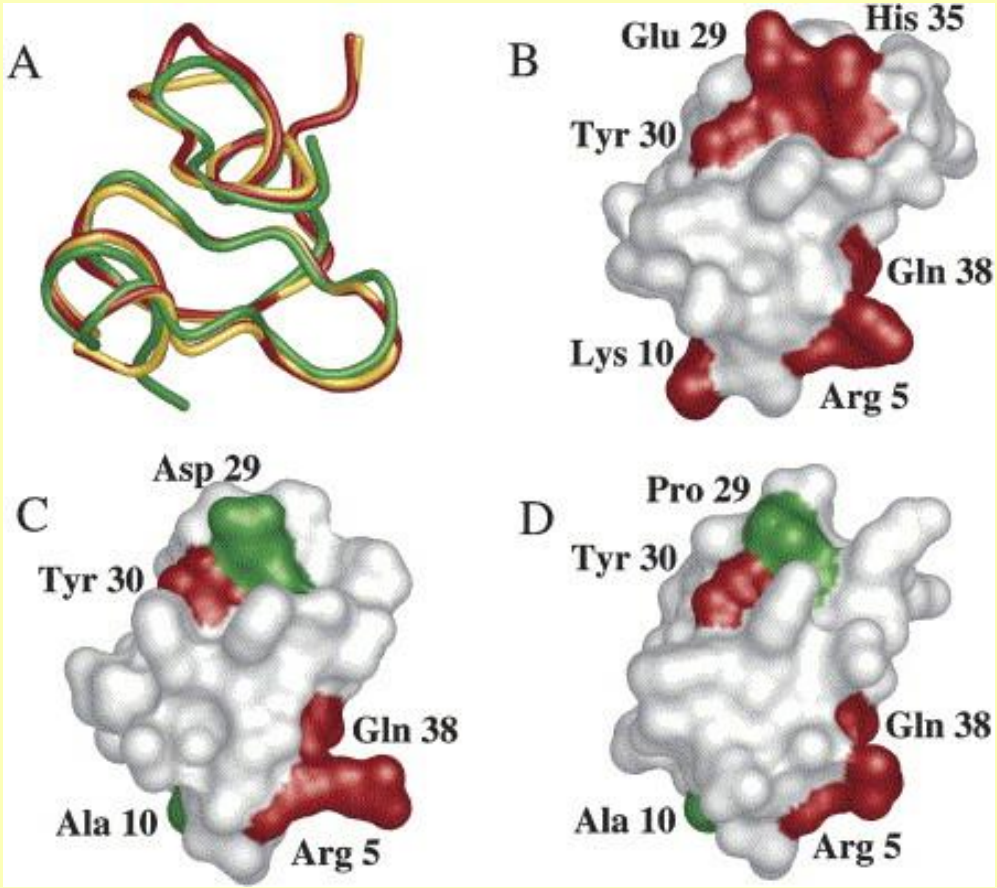

USA & UK
Milk
Egg
Peanut
Tree Nuts
Seafood
ITALY
Milk
Egg
Seafood
SINGAPORE
Birds Nest
Seafood
Egg
Milk
AUSTRALIA
Milk
Egg
Peanuts
Sesame
FRANCE
Egg
Peanuts
Milk
Mustard
ISRAEL
Milk
Egg
Sesame

# Multiple food allergy

- Food contamination
- Cross reactivity
- Food chemical sensitivity
- True multiple food allergy
- Somatisation/ aversion

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

# Hevein-like domains account for latex-food syndrome




Karisola JACI 2006

# Cross-reactive syndromes

| Inhalant allergy | Food allergy |
|---|---|
| Birch pollen | Nuts, apple, pear, peach, plum, cherry, carrot, peanut, soy |
| Ragweed pollen | Melon, banana |
| Grass pollen | Tomato, peanut, pea, wheat, rye |
| Latex | Banana, chestnut, kiwi, avocado |
| Chironomids | Crustaceans |

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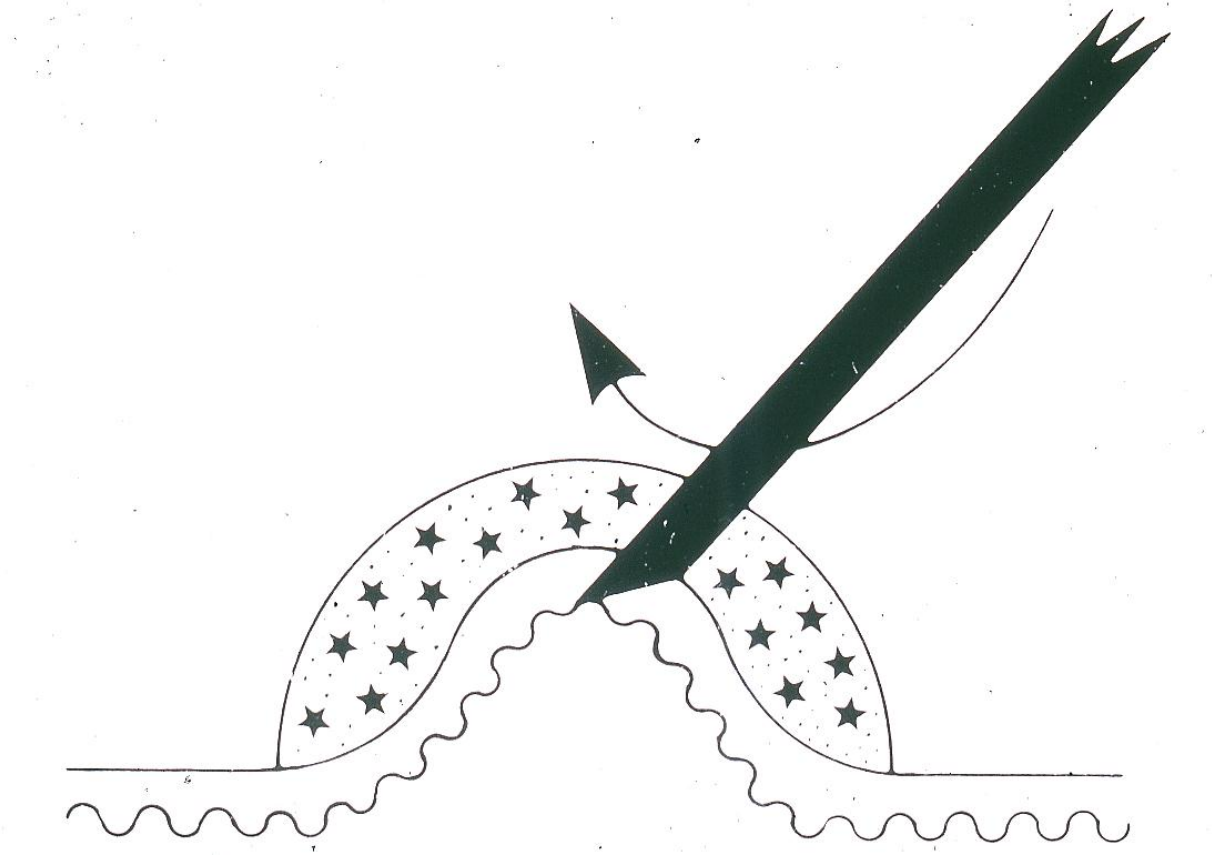
# Diagnostic procedures

- Short term elimination diets
- Food challenges
- Skin testing
- RAST testing
- Food patch testing
- Novel methods incl peptide microarrays

# Food challenges

- Open challenge in physicians rooms
- Double blind challenge (DBPCFC)
- May require admission
- Clearing of skin required.  Stop medications
- Dietician is aware of food/placebo given
- 3-4 challenges over several days
- Open challenge before discharge

# Skin testing



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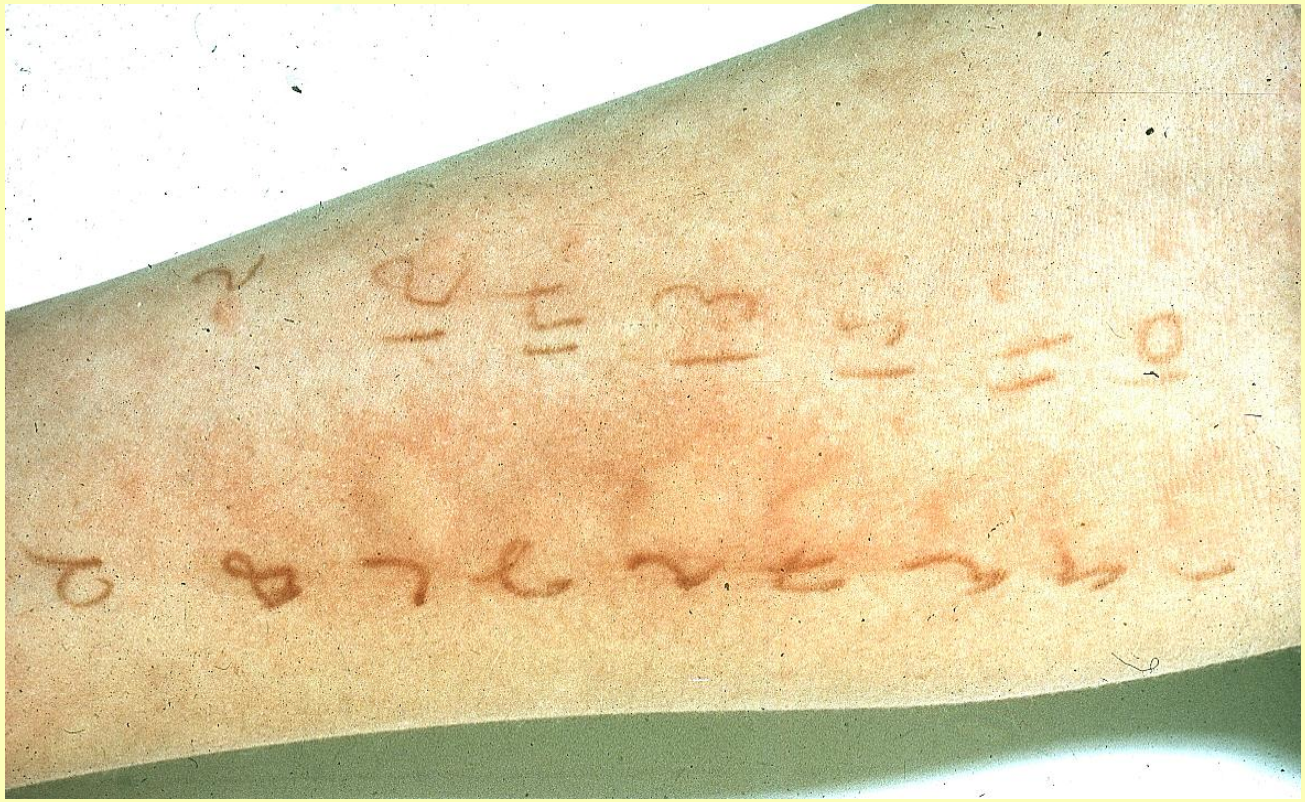

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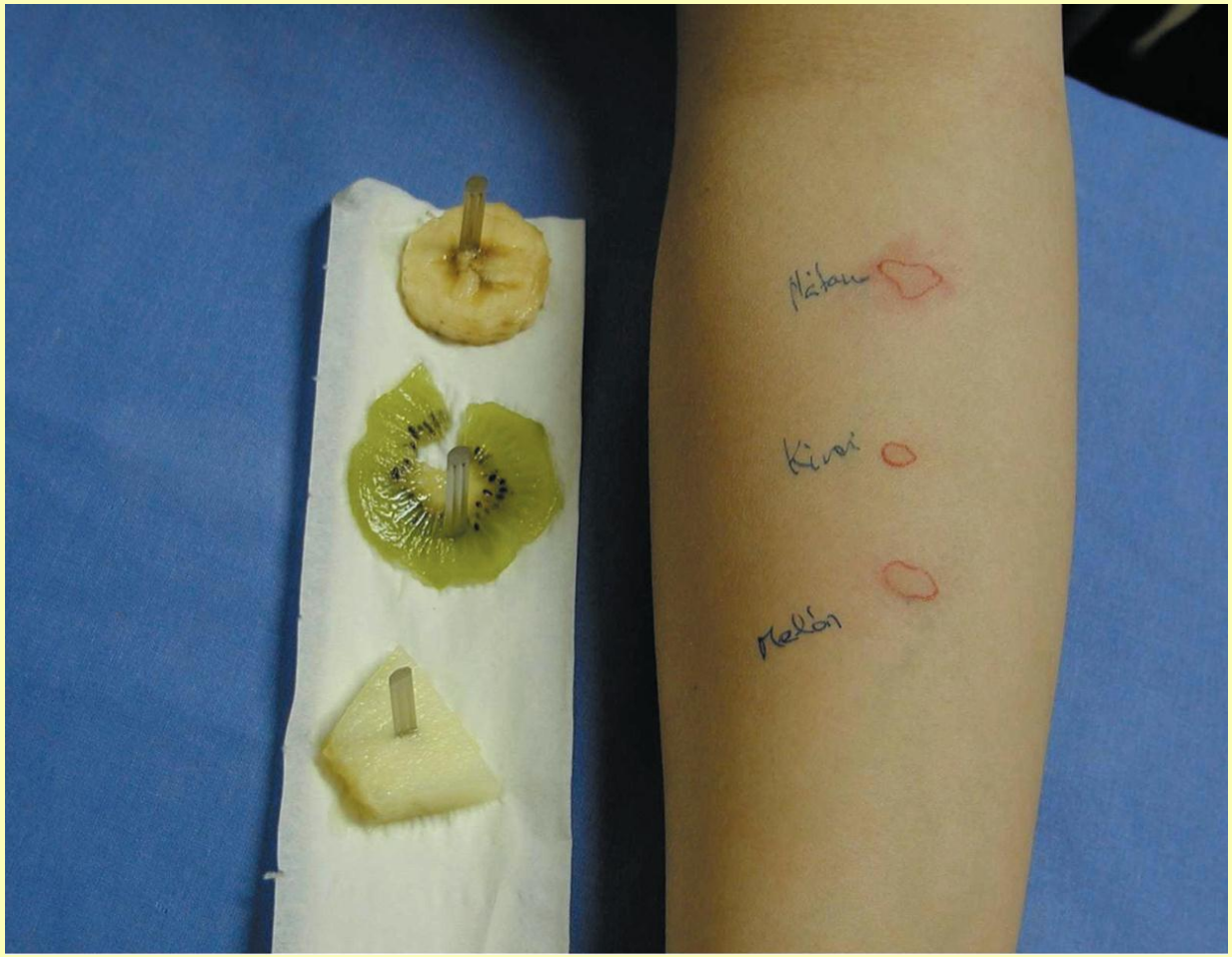

# RAST testing

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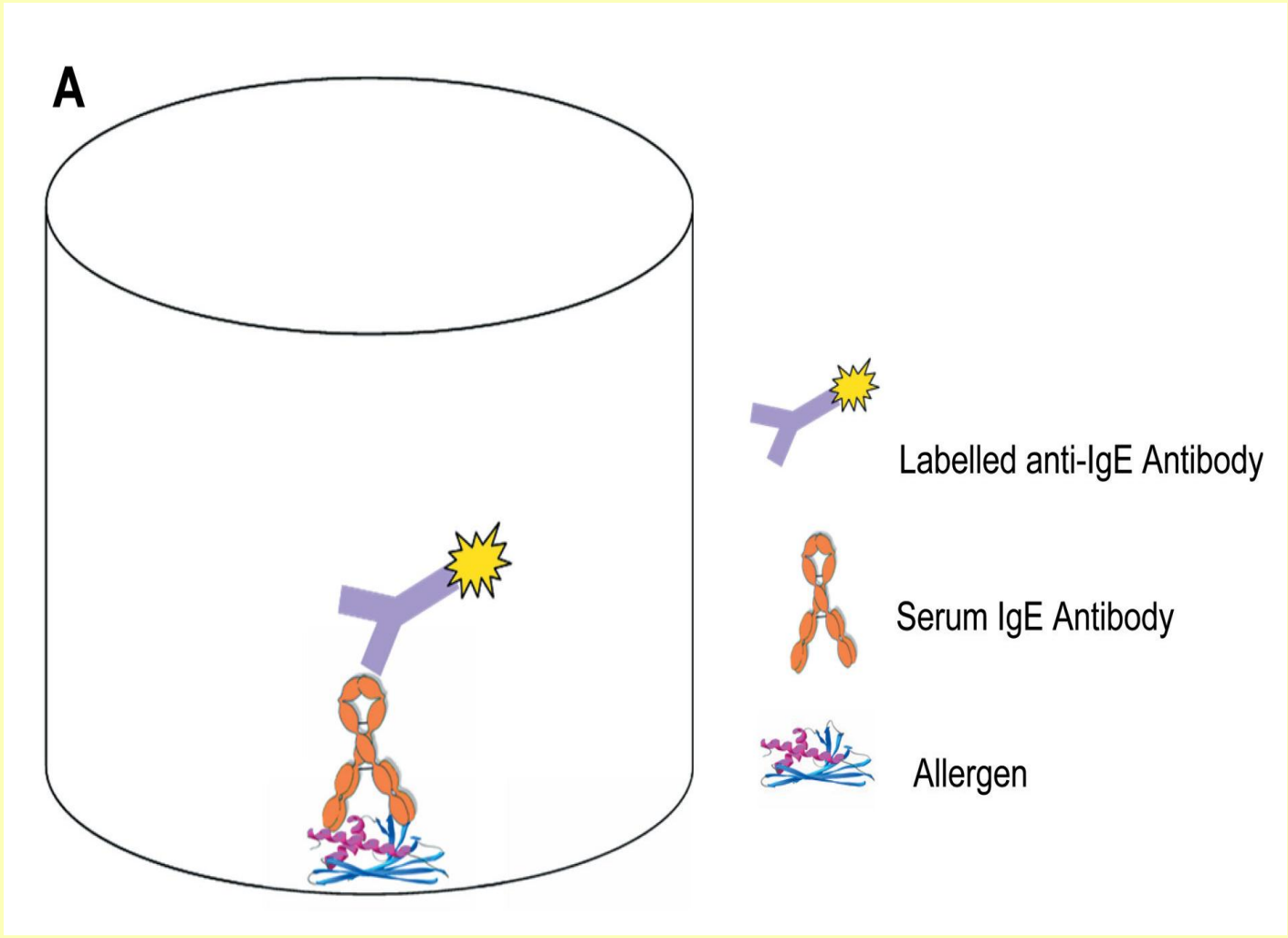
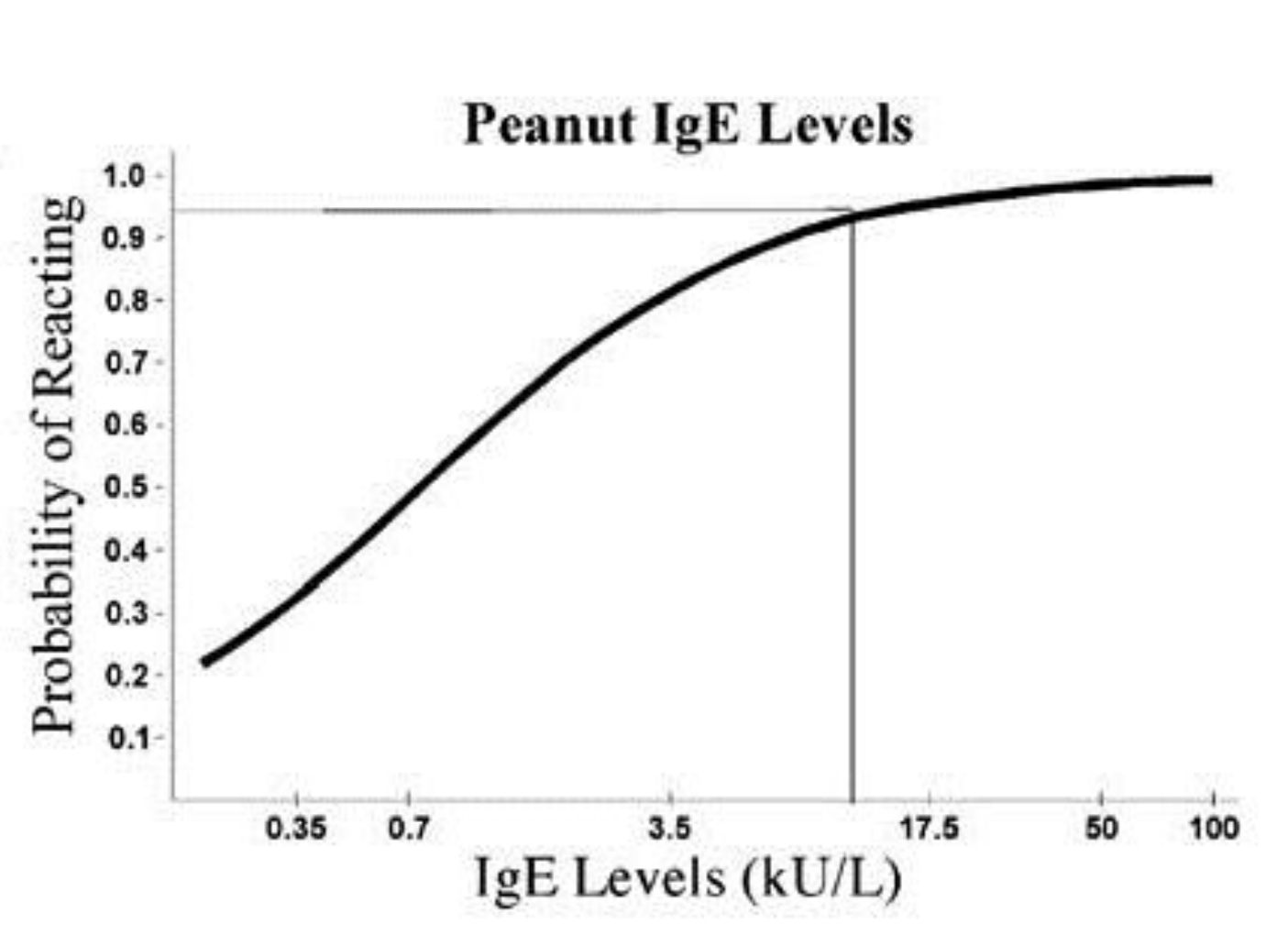


# RAST testing

| Food | cut-off | sensitivity | specificity |
|---|---|---|---|
| Egg | 6.0 U/ml | 61% | 92% |
| Milk | 15 U/ml | 51% | 98% |
| Peanut | 15.0 U/ml | 73% | 92% |
| Fish | 19.5 U/ml | 40% | 99% |
| Wheat > | 100 U/ml | PPV | 60% |
| Soy > | 100 U/ml | PPV | < 50% |

# RAST testing and probability of clinical reactions



# Determinants of the severity of a reaction

- Sensitivity (food specific IgE)
- Amount of food consumed
- Digestion: use of antacids
- Absorption rate (slowed by charcoal)
- Co-factors (aspirin, exercise, alcohol)
- Sensitivity can increase with subsequent exposures (memory)
- Allergenicity of the food

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# Pathogenesis

IgE → Non-IgE

Anaphylaxis/angioedema

Gastrointestinal anaphylaxis

Oral Allergy Syndrome

Eczema

Allergic Eosinophilic Esophagitis,

Gastritis & Gastroenteritis

Dietary protein colitis,

proctitis and enteropathy

[Celiac Disease]

# Spectrum of IgE mediated food allergy

- Anaphylaxis, urticaria, angioedema: classical anaphylactic reaction
- Gastrointestinal anaphylaxis: no cutaneous symptoms
- Food-dependent exercise induced anaphylaxis
- Oral allergy syndrome: include itching of the mouth, and swelling of the tongues and lips - associated with eating FRESH apple, carrots, hazelnut, bananas, melons
- Eczema: Up to 50% of young children with eczema may have a food allergy trigger
- Eosinophilic enteritis incl esophagitis
- Milk-allergy has been associated with nausea, vomiting, diarrhea, bloating, early satiety, reflux, esophagitis, gastritis, malabsoption, abdominal pain, and bloody stool

# Food-dependent exercise induced anaphylaxis

- Anaphylaxis occurs if individual exercises within 2 hrs of eating the food to which he/she only mild-moderately allergic to
- No reaction if food eaten without exercise
- Common foods: wheat, seafood, chicken, celery
- Other cofactors: aspirin, alcohol
- Usually SPT/RAST positive to the food
- Up to 25% of anaphylaxis associated with exercise

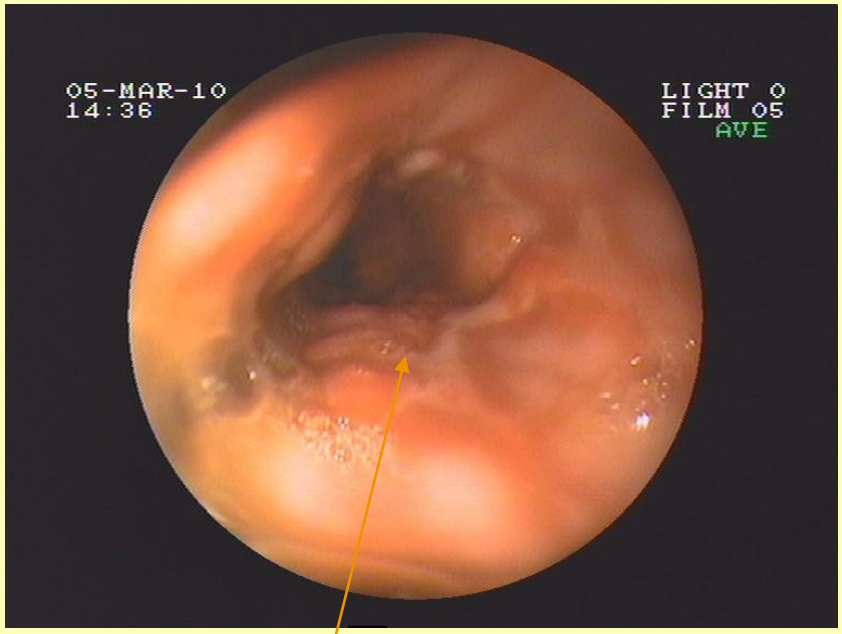
# Food allergy as a trigger for eczema

- Food allergy; trigger for eczema in 1/3
- 470 children with eczema studied at JHU
- Admitted to the unit to clear their eczema
- 1776 challenges undertaken (3-4 / patient)
- 1/3 had positive reactions (714 challenges)
- Reactions
  - Skin 74% (529)
  - GI 50% (358)
  - Resp 45% (322)
- All reactions occurred within 2 hours

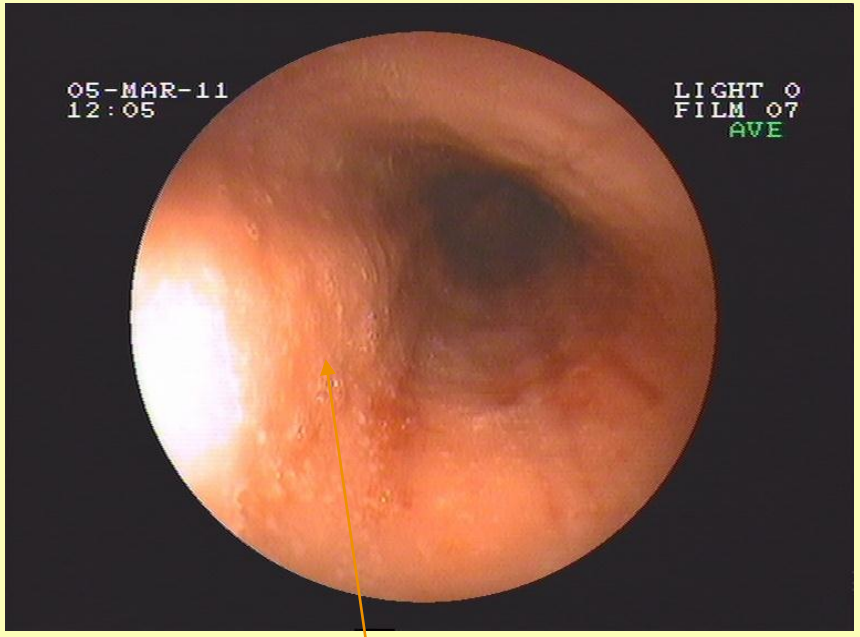
# Allergic eosinophilic esophago/gastroenteritis

- Form of food allergy
- Responds poorly to standard reflux treatment
- Eosinophils in blood or esophagus
- May have a food allergy trigger
- Elimination of food and steroids required for treatment
- Inadequate treatment may lead to permanent stricture of esophagus
- Can affect other parts of the gut
- New six food elimination diet

# Allergic eosinophilic esophagitis endoscopic findings

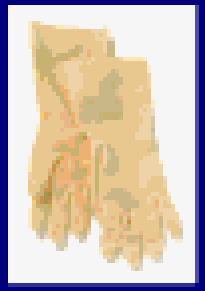


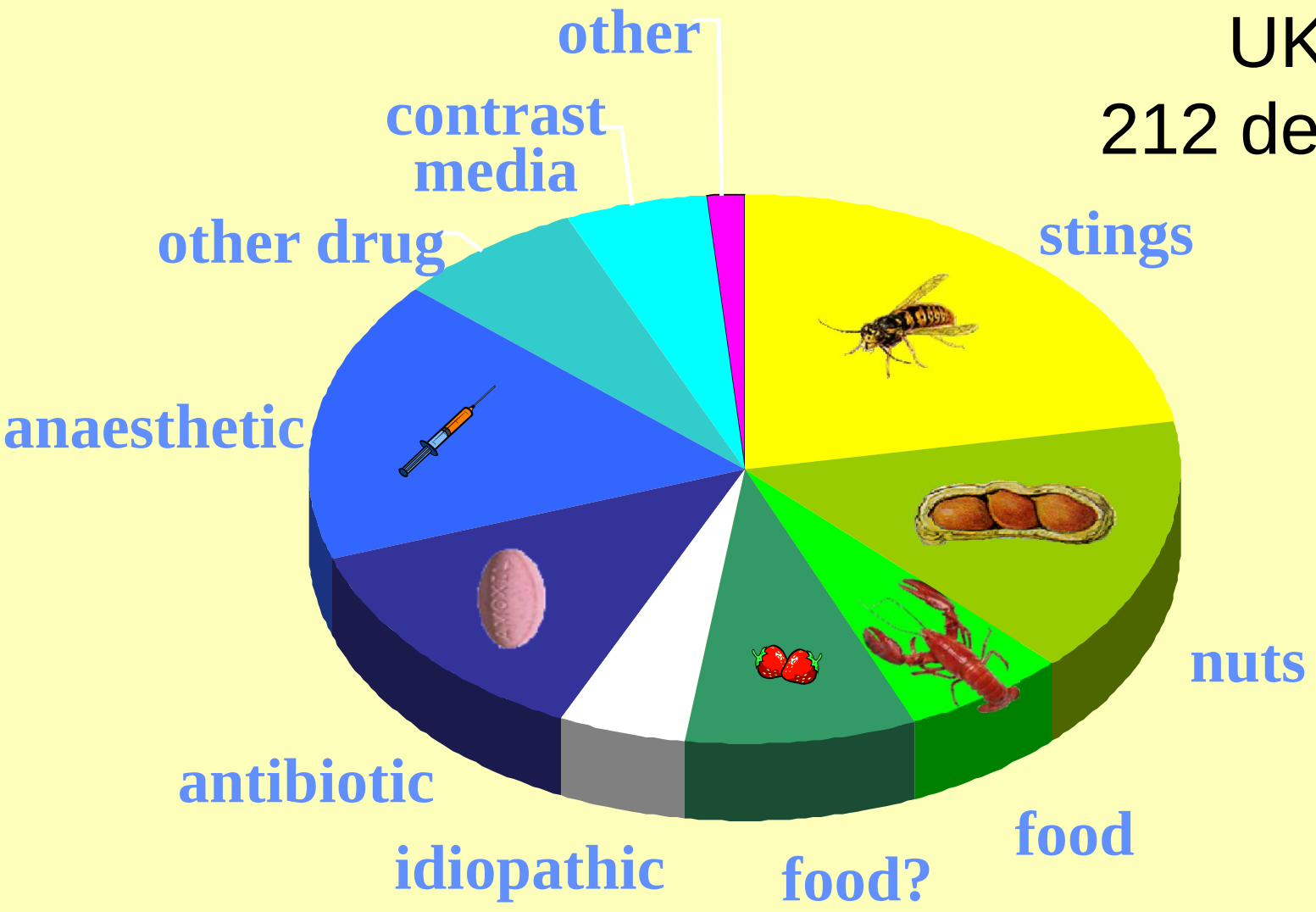

Rings




White plaques (eosinophils)

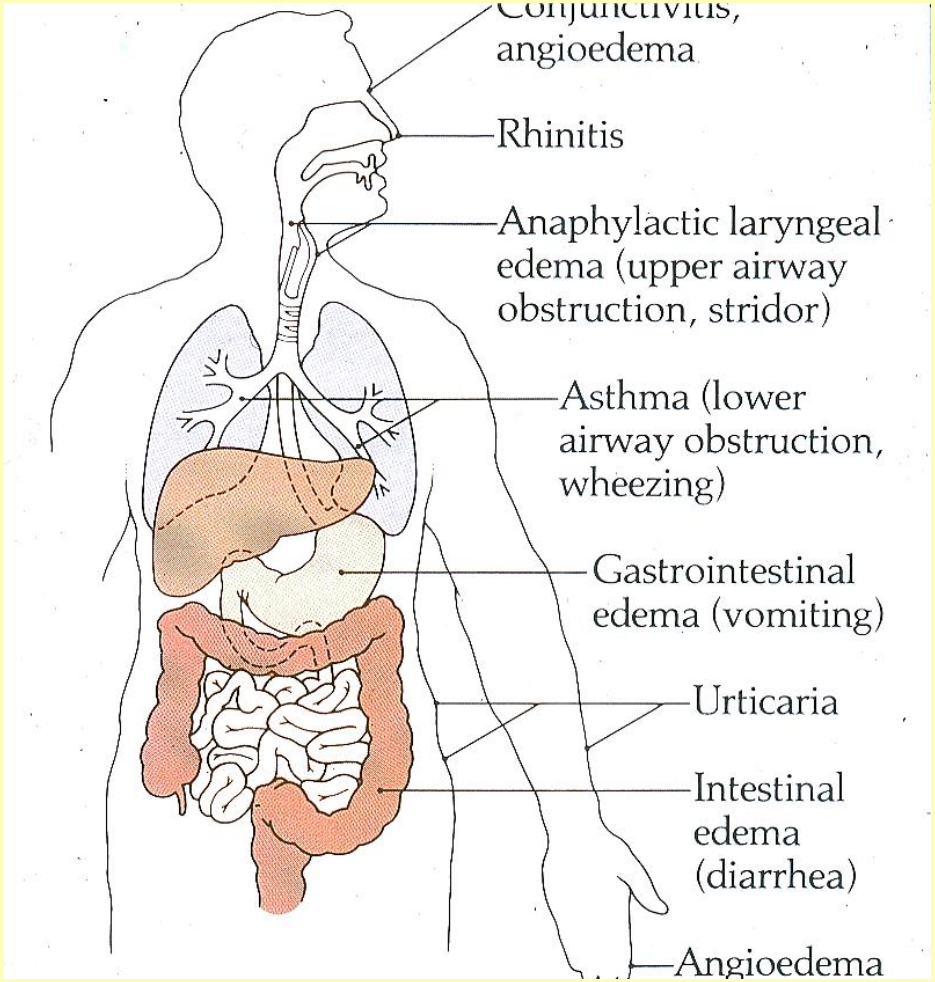
# Causes of Anaphylaxis



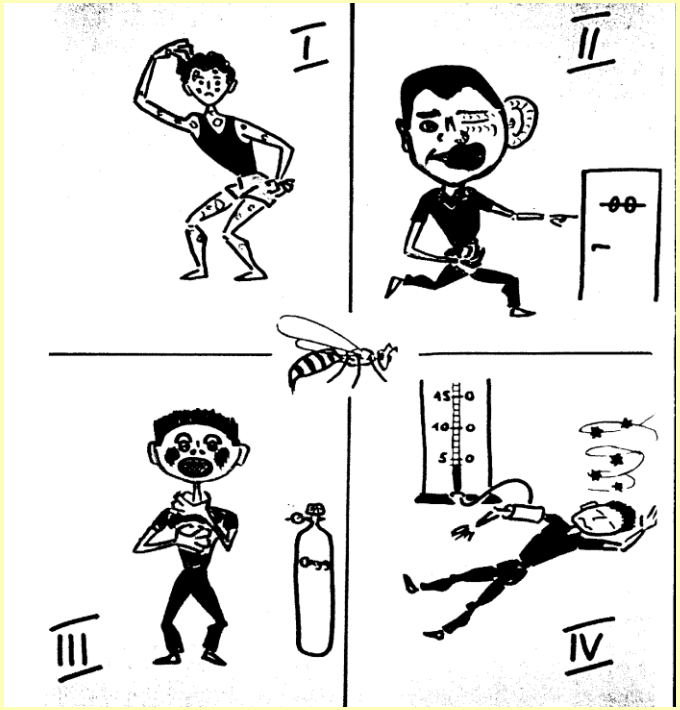



Pumphrey, Clin Exp Allergy, 2000

# Clinical features of anaphylaxis



# Severity of allergic reactions



# Treatment of anaphylaxis

- Keep patient lying flat- risk of sudden death
- Elevate legs to assist venous return
- Risk of late reactions
- Patients should be admitted/observed for at least 6 hours
- Serum tryptase 1-2 h after reaction
- Fill out ACC form

# Adrenaline

- Dose Adults 0.3-0.5 mg
  Children 0.01 ml/kg 1:1000 ie 10 µg/Kg
- EPI-PEN/ ANAPEN 0.3 mg
- EPI-PEN Jr/ ANAPEN Jr 0.15mg (8-20Kg)
- Syringe, needle and vial of adrenaline
- Adrenaline Inhaler- potential problems
- IV adrenaline only for cardiac arrest

# Individuals at increased risk

- Patients with asthma
- Antihypertensives esp β blockers
- MAO inhibitors
- Cardiovascular disease
- Pregnancy

# Differential diagnosis of anaphylaxis

- CVS — MI, Cardiac arrest, dysrhythmia
- Endo — carcinoid, pheo, hypoglycemia
- Resp — asthma, hyperventilation, foreign body, pulmonary embolus, pneumothorax, vocal cord dysfunction
- CNS — epilepsy, stroke
- Misc — Hereditary angioedema, drugs

# Self-injectable adrenaline

# Self-injectable adrenaline

# Self-injectable adrenaline

# Anaphylaxis action plan

## ACTION PLAN FOR Anaphylaxis

Name: _____

Date of birth: _____

Photo

Allergens to be avoided:

Family/carer name(s):

Work Ph:

Home Ph:

Mobile Ph:

Plan prepared by:

Dr

Signed

Date

### How to give EpiPen® or EpiPen® Jr

1. Form fist around EpiPen® and **PULL OFF** grey cap.

2. Place black end against outer mid-thigh (with or without clothing).

3. Push down **HARD** until a click is heard or felt and hold in place for 10 seconds.

4. Remove EpiPen® and be careful not to touch the needle. Massage the injection site for 10 seconds.

### MILD TO MODERATE ALLERGIC REACTION

- swelling of lips, face, eyes
- hives or welts
- tingling mouth, abdominal pain, vomiting

### ACTION

- stay with person and call for help
- give medications (if prescribed) .....
- locate EpiPen® or EpiPen® Jr
- contact family/carer

**Watch for any one of the following signs of Anaphylaxis**

### ANAPHYLAXIS (SEVERE ALLERGIC REACTION)

- difficult/noisy breathing
- swelling of tongue
- swelling/tightness in throat
- difficulty talking and/or hoarse voice
- wheeze or persistent cough
- loss of consciousness and/or collapse
- pale and floppy (young children)

### ACTION

1 **Give EpiPen® or EpiPen® Jr**
2 **Call ambulance*- telephone 000 (Aus) or 111 (NZ)**
3 **Lay person flat and elevate legs. If breathing is difficult, allow to sit but do not stand**
4 **Contact family/carer**
5 **Further EpiPen® doses may be given if no response after 5 minutes**

**If in doubt, give EpiPen® or EpiPen® Jr**

EpiPen® Jr is generally prescribed for children aged 1-5 years.
*Medical observation in hospital for at least 4 hours is recommended after anaphylaxis.

Additional information

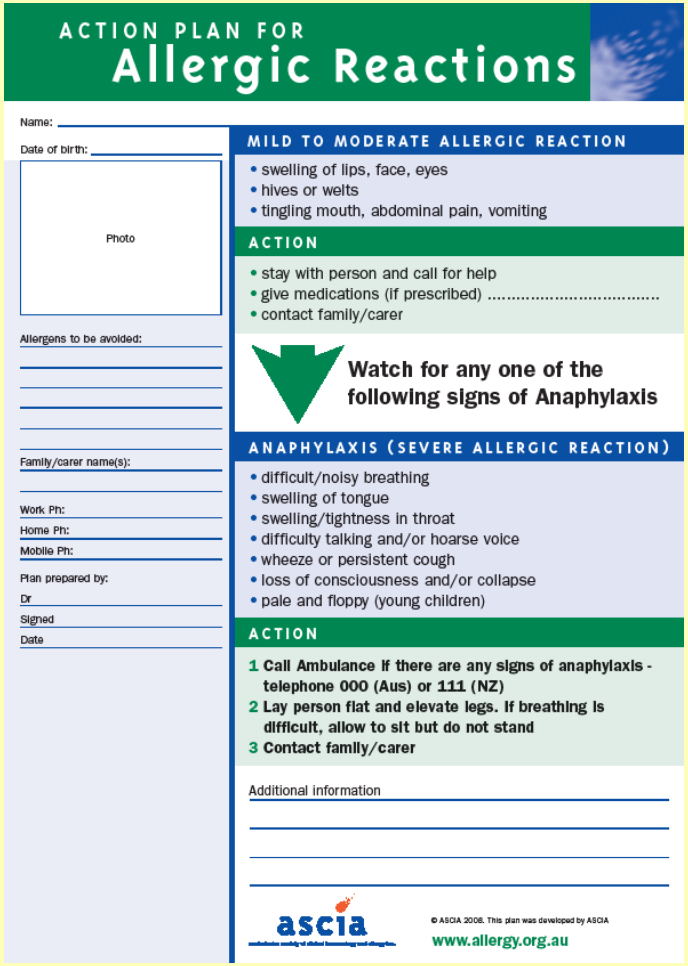
ascia



www.allergy.org.au

**www.allergy.org.au**

# Non-anaphylaxis action plan



ACTION PLAN FOR
## Allergic Reactions

Name:

Date of birth:

Photo

Allergens to be avoided:

Family/carer name(s):

Work Ph:

Home Ph:

Mobile Ph:

Plan prepared by:

Dr

Signed

Date

### MILD TO MODERATE ALLERGIC REACTION

- swelling of lips, face, eyes
- hives or welts
- tingling mouth, abdominal pain, vomiting

### ACTION

- stay with person and call for help
- give medications (if prescribed) .....
- contact family/carer

**Watch for any one of the following signs of Anaphylaxis**

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- loss of consciousness and/or collapse
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### ACTION

**1 Call Ambulance if there are any signs of anaphylaxis - telephone 000 (Aus) or 111 (NZ)**
**2 Lay person flat and elevate legs. If breathing is difficult, allow to sit but do not stand**
**3 Contact family/carer**

Additional information

ascia



www.allergy.org.au

**www.allergy.org.au**

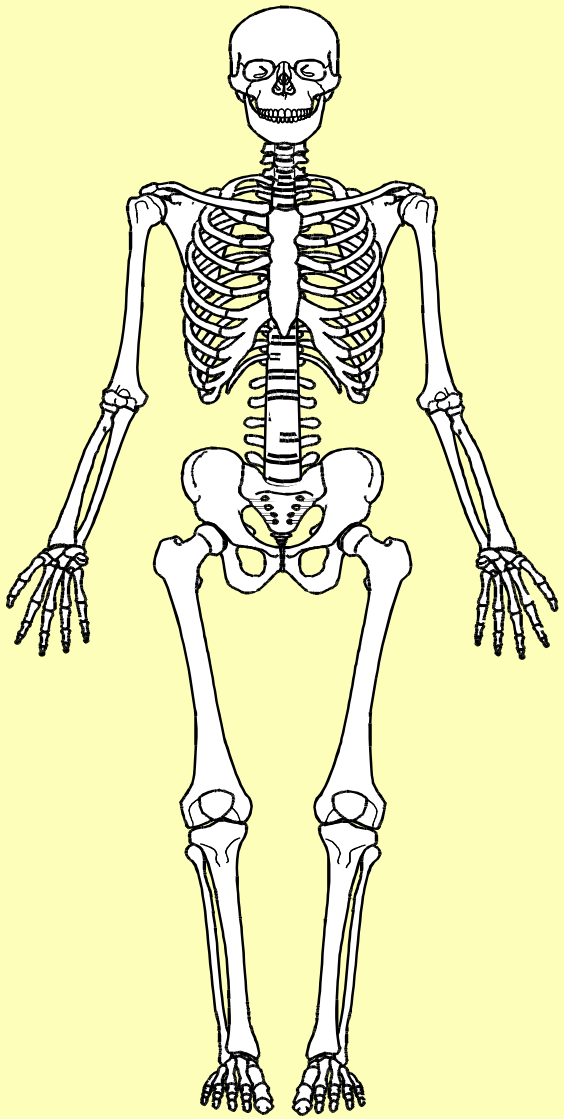
# MEDICAL EMERGENCY


This emblem
could save your life
or the life of someone
you love

**ASK YOUR DOCTOR FOR DETAILS**
**OR TELEPHONE**
**MEDIC ALERT 04-528-8219**

# Food allergen avoidance/ Long-term elimination diets

- Accurate diagnosis is critical
- Paediatric dietician assessment essential
- Reading food labels
- Manufactured Food Database
- Allergy New Zealand incl e-mail alerts



# Food allergies

"I was on an elimination diet"

# Nutritional risks of long-term elimination diets

| Allergen | Vitamin and Minerals |
|---|---|
| Milk | Vitamin A, vitamin D, riboflavin, pantothenic acid, vitamin $B_{12}$, calcium, & phosphorus |
| Egg | Vitamin B12, riboflavin, pantothenic acid, biotin, & selenium |
| Soy | Thiamin, riboflavin, pyridoxine, folate, calcium, phosphorus, magnesium, iron, & zinc |
| Wheat | Thiamin, riboflavin, niacin, iron, & folate if fortified |
| Peanut | Vitamin E, niacin, magnesium, manganese, & chromium |

# Emergency management plan

- Written action plan
- MEDIC-ALERT emblem-velcro
- Public Health nurses to visit school/daycare
- Anaphylaxis video (Allergy NZ)
- Follow up RAST testing 6-12 monthly
- Food challenge if RAST becomes negative

# Fatalities from food allergy

- Food allergy is the leading cause of anaphylaxis requiring ER visits - with twice the incidence, and three times the mortality, of anaphylactic reaction to bee stings
- Approx. 125 people die in USA each year
- In Canada 8 people died from food in 1998
- In Australia 5 recent deaths
- ? In NZ 1-2 deaths every 1-2 yrs

# Risk factors for fatal reactions

- Peanut or tree nut allergy
- Previous severe food reaction
- Asthmatic- most deaths result from asthma
- Adolescent / teen-age
- Adrenaline – unavailable or not used early
- No Emergency “action plan”
- Allergy Un-awareness / Un-educated
- “Healthy degree” of anxiety is required

# Natural History of food allergy

- Milk and egg allergy improve over time
- Once remission occurs, no recurrence
- Taste may be an issue
- Recent data suggesting milk allergy may persist into adolescence
- 20-30% of peanut allergy remits: serial RASTs
- Up to 9% of children with tree nut allergy improve

# Peanut allergy


"Bit of a bummer really,
you've got a nut allergy"

# The future of food allergy

- Avoidance of foods
- Neonatal prevention studies- ongoing
- Anti IgE studies
- Peanut desensitisation
- Modified allergens
- Chinese herbal preparation
- ???

# Chinese herbal preparation FAHF-2 prevents murine peanut anaphylaxis


Srivastava JACI 2005

# Anti-IgE therapy

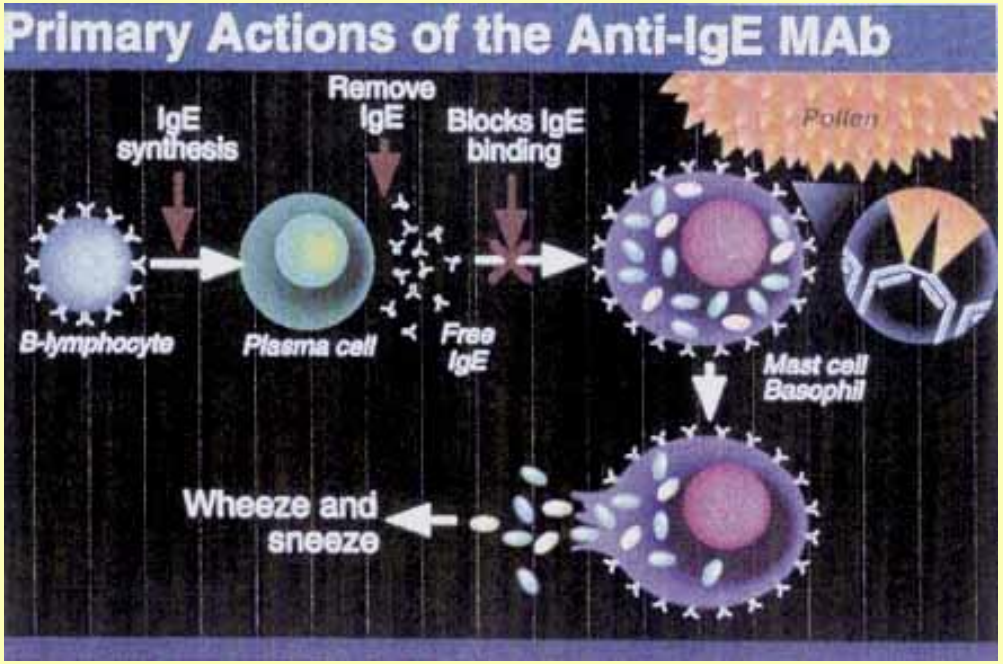
- Recent study with TNX 901 showed anti-IgE therapy can markedly improve peanut allergy
- Threshold doses increased from 1/2 peanut to 8 peanuts
- Lawsuit- project discontinued
- Currently phase 2 study of Omalizumab (Xolair)

**Leung et al NEJM 2004**

# Omalizumab


NOVARTIS
Xolair 150 mg
omalizumab (rch)
Powder and diluent for injection
For subcutaneous use only.

# Omalizumab


Primary Actions of the Anti-IgE MAb
IgE synthesis
Remove IgE
Blocks IgE binding
Pollen
B-lymphocyte
Plasma cell
Free IgE
Mast cell Basophil
Wheeze and sneeze

# Unrestricted education grants for research

Nutricia

Fonterra

# Paediatric food allergy/ eczema clinic JHU

Prof Robert Wood

Prof Hugh Sampson

Prof Ken Schurberth