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Managing food allergies in the real world

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MRC Medical Research Council | KING'S College LONDON | Imperial College London | asthma UK

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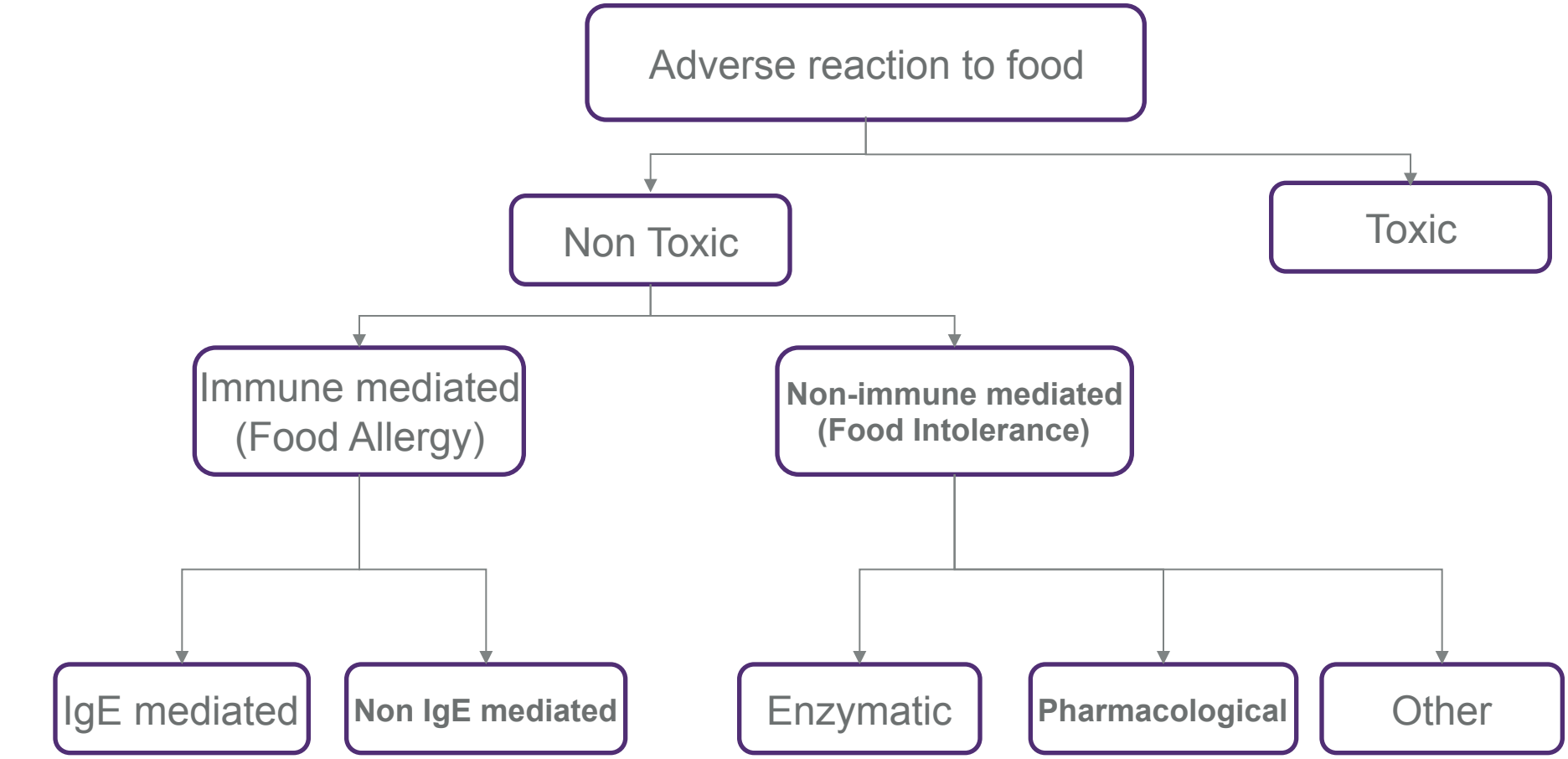
Is there a Food Allergy epidemic?

Little robust evidence

Best evidence for peanut

Sicherer S et al. JACI 2003
Grundy J et al. JACI 2002

Classification of Reactions



Immediate food allergy

Oral Allergy Syndrome

Coeliac Disease

Food Protein Enteropathies

Eosinophilic Gastroenteropathies

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Prevalence of Food Allergy

Food	*Young Children*						*Adults*
	USA	AUS	FRA	NOR	CH	UK	USA
Milk	2.5%	2.7%	1.1%	3.2%	1.7%	2.3%	0.3%
Egg	1.3%	8.9%	0.8%	2.6%	3.0%	1.3%	0.2%
Peanut	0.8%	3.0%	0.7%	-	0.3%	1.8%	0.6%
TreeNuts	0.2%	-	0.7%	-	-	-	0.5%
Fish	0.1%	-	-	-	0.3%	-	0.4%
Shellfish	0.1%	-	1.4%	-	-	-	2.0%
Sesame	-	0.8%	-	-	-	-	-
Overall	6.0%	10%	6.0%	-	5.2%	5.5%	3.7%

Hu Y, Li H Chin. J. Pediatr 2000,38:431 (CHINA)
Osbourne N et al. JACI 2011; 127:668-76 (AUS)
Eggesbo M et al J.Paed 2001,139:583 (NOR)

Venter C , et al JACI 2006; 117:1118 (UK)
Sampson H.A. JACI 2004;13:806. (USA)
Rance F et al CEA 2005;35:167.(FRA)
Hourihane J et al JACI 2006;119:1197 (UK)

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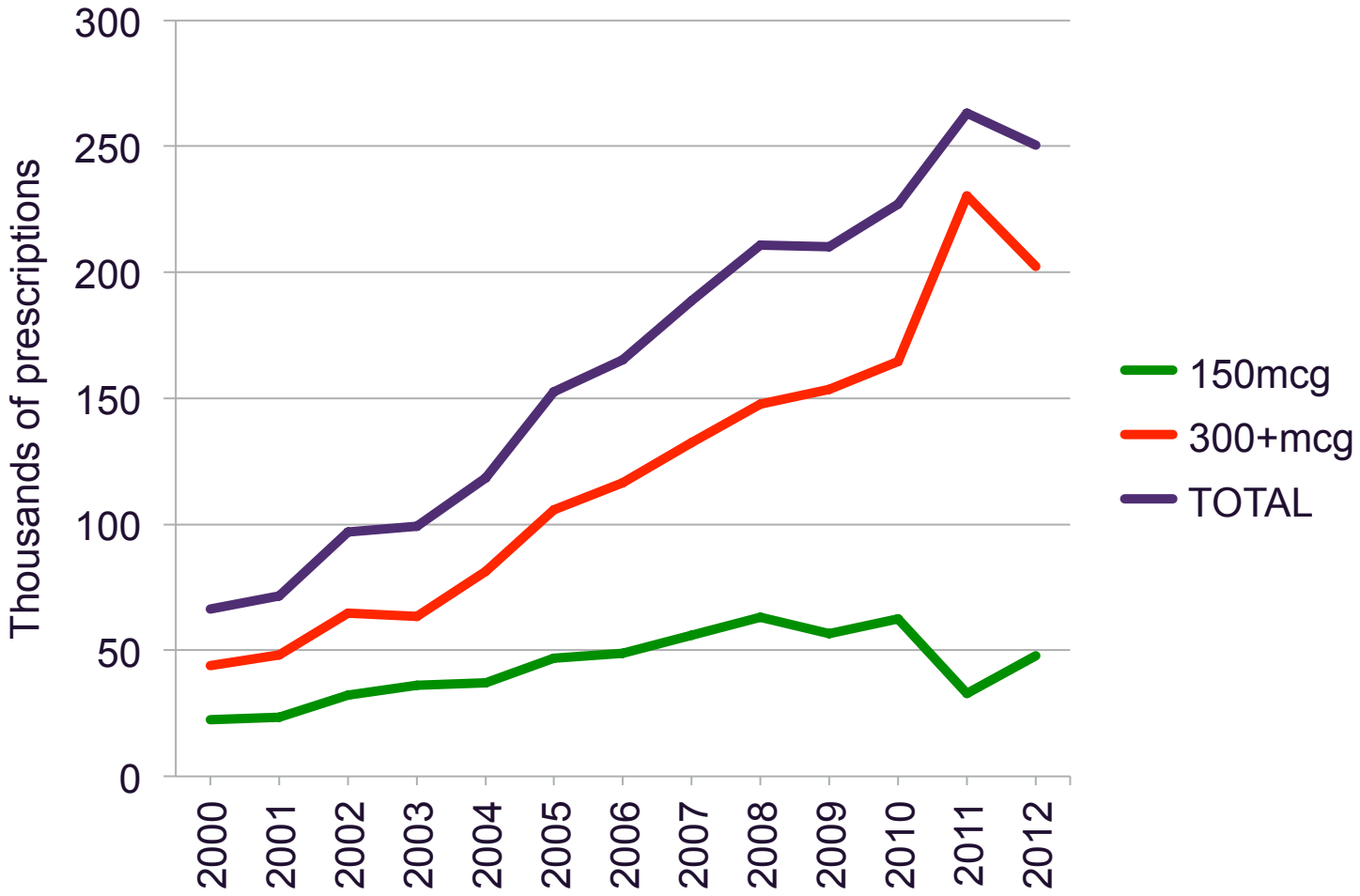
Adrenaline auto-injector devices



Data: NHS Prescription Cost Analysis for England, 2000-2012

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ORIGINAL ARTICLE GASTROINTESTINAL DISEASES

Time trends in the prevalence of peanut allergy: three cohorts of children from the same geographical location in the UK

C. Venter[1,2], S. Hasan Arshad[1], J. Grundy[1], B. Pereira[1], C. Bernie Clayton[1], K. Voigt[1], B. Higgins[2] & T. Dean[1,2]

[1]The David Hide Asthma and Allergy Research Centre, St. Mary's Hospital, Newport, Isle of Wight, UK; [2]School of Health Sciences and Social Work, University of Portsmouth, Portsmouth, UK

To cite this article: Venter C, Hasan Arshad S, Grundy J, Pereira B, Bernie Clayton C, Voigt K, Higgins B, Dean T. Time trends in the prevalence of peanut allergy: three cohorts of children from the same geographical location in the UK. *Allergy* 2010; **65**: 103–108

- Community cohort of children born 1989 vs 1994-96 vs 2001-2 on IoW
- Questionnaire/examination/SPT at 1,2,3 yrs of age
- OFC for any +ve SPT if no Hx of tolerance OR any suspicion of reaction, regardless of SPT

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Results

In 2001/2 cohort of 969 children:

- 33.7% of parents reported a food related problem
- 5.3% sensitised to food
- 6% had FA at open OFC
- 5% had FA by DBPCFC

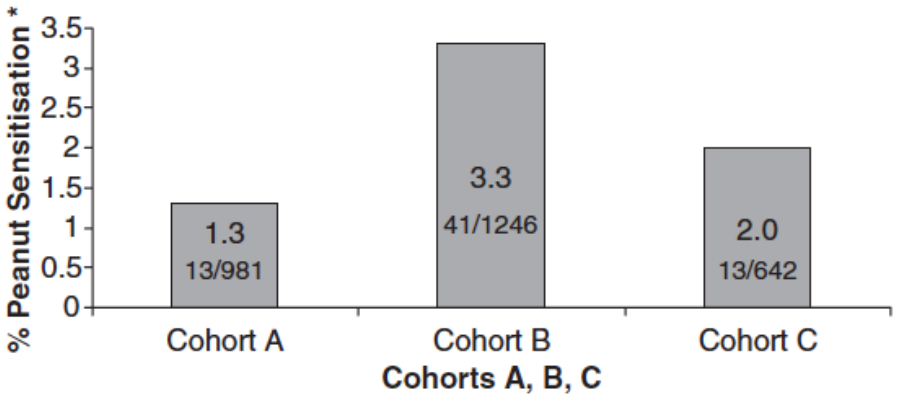

Figure 1 Comparison of sensitization to peanuts in three cohorts of children aged 3–4 years. *Test for trend: Chi-square (quadratic component) $P = 0.005$.

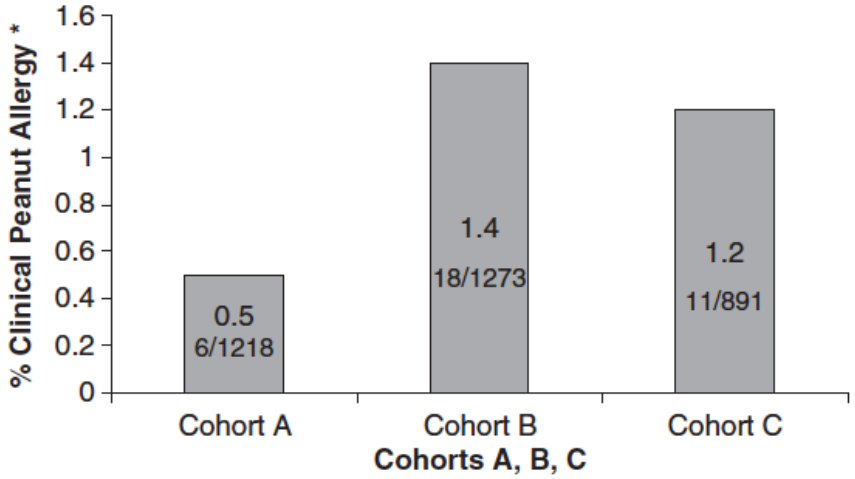

Figure 2 Comparison of peanut allergy in three cohorts of children aged 3–4 years. *Test for trend: Chi-square (quadratic component) $P = 0.127$.

Prescott *et al. World Allergy Organization Journal* 2013, **6**:21
http://www.waojournal.org/content/6/1/21

WAO journal
WORLD ALLERGY ORGANIZATION

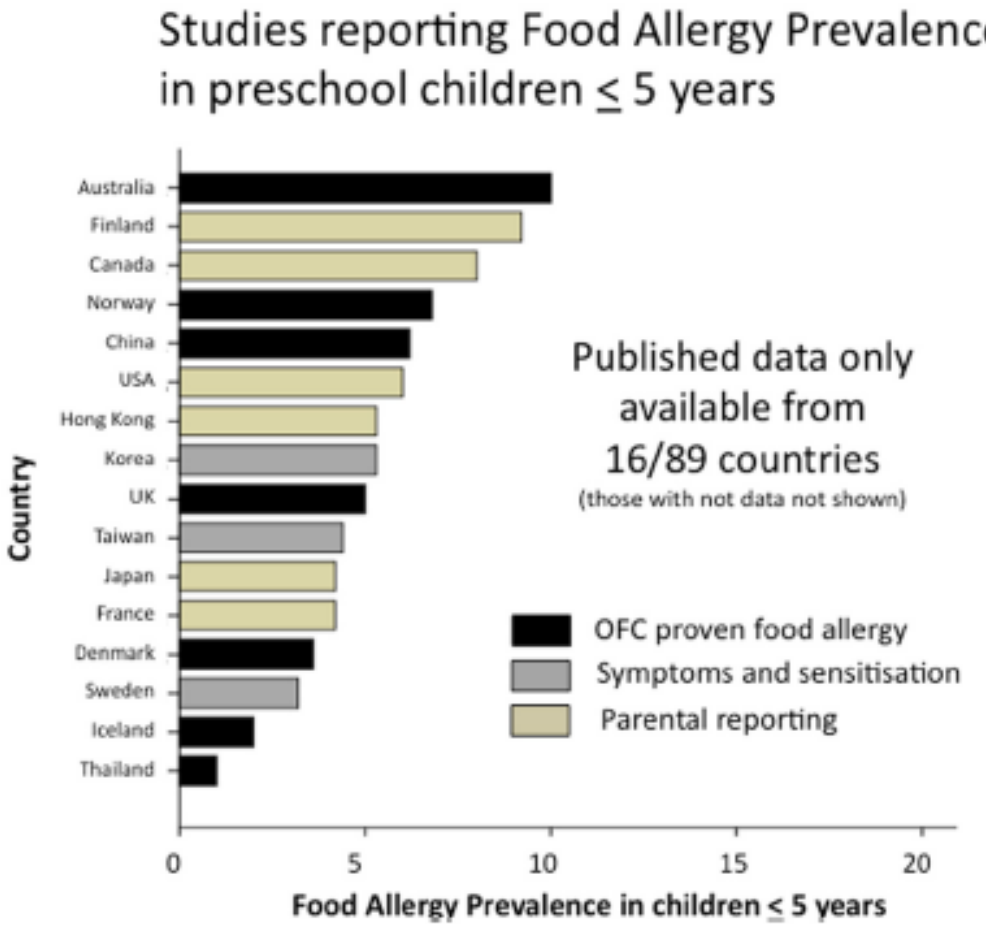

Figure 2 Summary of food allergy prevalence from studies that provided data for children aged 5 years or less. Studies are categorised according to level of evidence; OFC proven food allergy (black bars); food allergy based on symptoms and sensitisation (grey bars) or questionnaires/parental reporting (yellow bars).

Prescott *et al. World Allergy Organization Journal* 2013, **6**:21
http://www.waojournal.org/content/6/1/21

WAO journal
WORLD ALLERGY ORGANIZATION

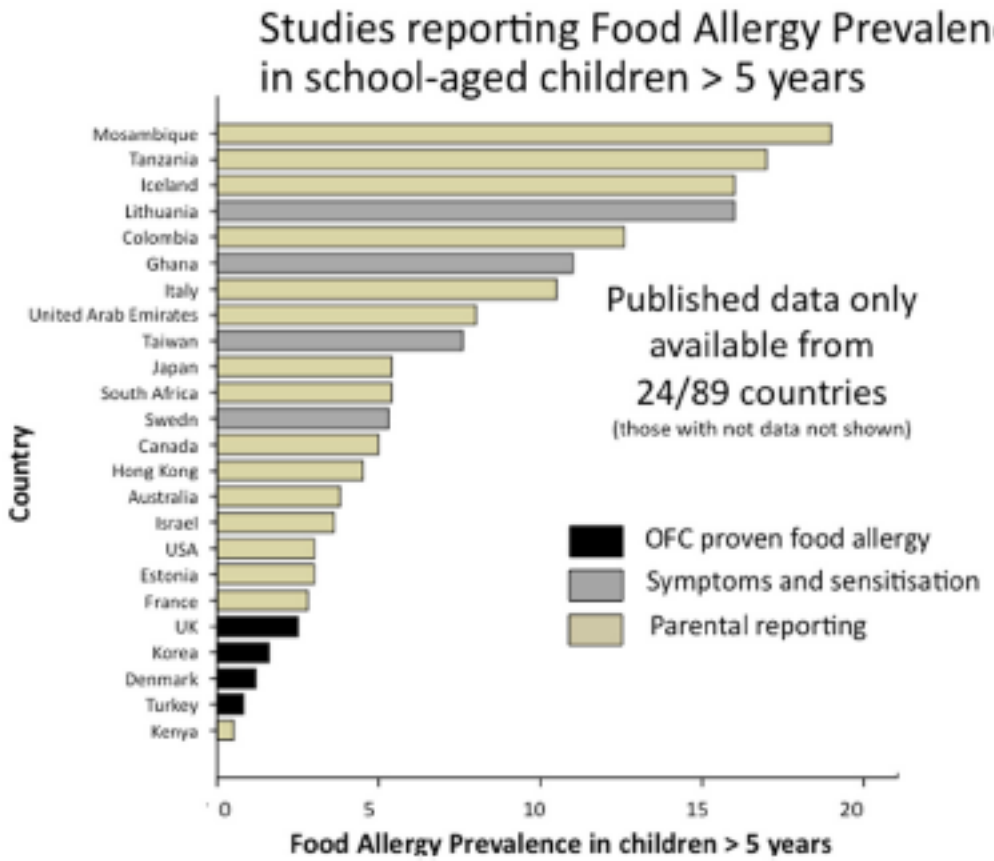

Figure 3 Summary of food allergy prevalence from studies that provided data for children older than 5 years. Studies are categorised according to level of evidence; OFC proven food allergy (black bars); food allergy based on symptoms and sensitisation (grey bars) or questionnaires/parental reporting (yellow bars).

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Foods implicated:

Allspice
Almond
Anise seed
Apple
Artichoke
Avocado
Baker's yeast
Banana
Barley
Bay leaf
Beet
Black Pepper
Brazil nut
Brewer's yeast
Buckwheat
Cantaloupe
Carrot
Cashew nut
Castor bean
Celery
Chamomile
Chestnut
Chicken
Chicory
Chilli
Chocolate
Cinnamon
Clam
Clove
Coconut
Cod
Coriander
Corn
Cow's Milk
Crab
Crustaceans
Cumin Seed
Cuttlefish
Dates
Egg
Fennel
Fig
Flaxseed
Food additives
French beans
Garlic
Ginger
Goat's milk
Halibut
Hazelnut
Honey
Hops
Horseradish
Juniper Berry
Kiwi
Lentil
Lima Bean
Limpet
Lobster
Lupine
Mango
Millet
Mushrooms
Mustard
Nutmeg
Oat
Orange
Oyster
Parsley
Pea
Peach
Peanut
Pecan nut
Pine nut
Pineapple
Pistachio
Pomegranate
Poppy seed
Potato
Psyllium seed
Raspberry
Royal jelly
Sage
Salmon
Sesame
Shellfish
Shrimp
Soy
Squash
Squid
Sunflower seed
Sweet Potato
Tangerine
Tapioca
Thyme
Turmeric
Vanilla
Walnut
Watermelon
Wheat

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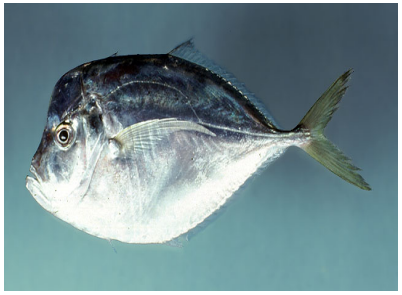
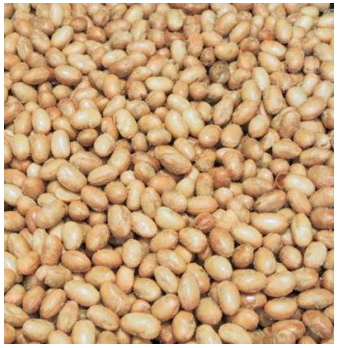
Foods that cause more than 90% of IgE-mediated FA in children

- Milk
- Eggs
- Peanuts
- Tree nuts and seeds
- Fish
- Shellfish
- Soy
- Wheat





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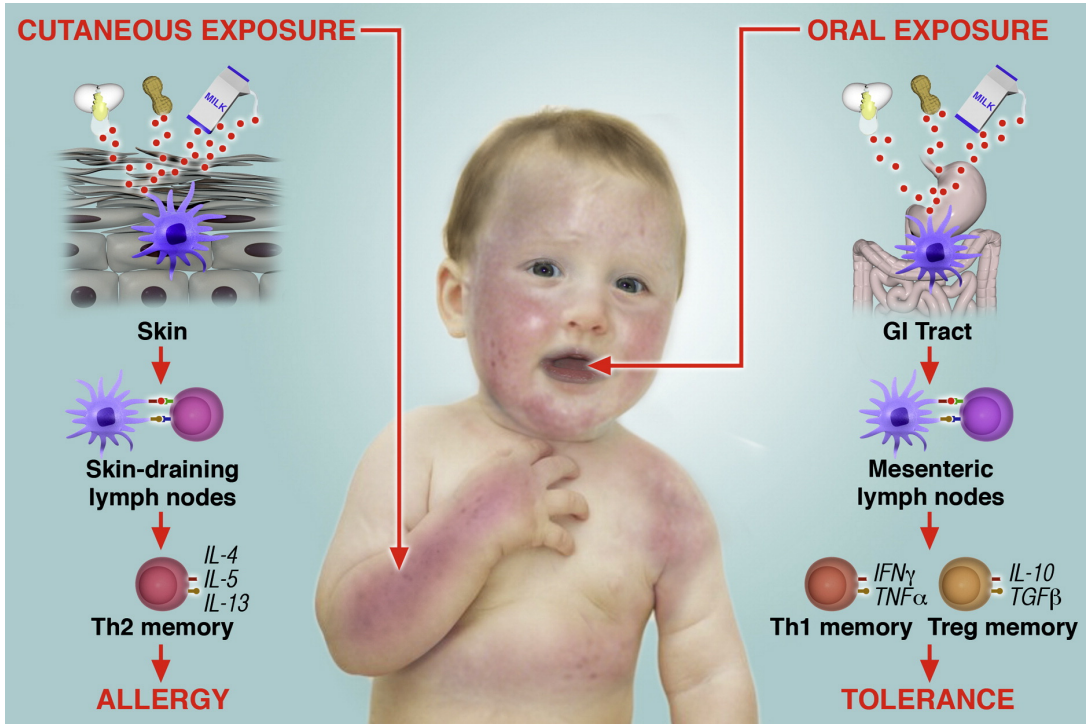
Explanations for the increase in PN allergy

- Change in peanut formulation/dietary consumption
- Changes in exposure / skin barrier function
- Impact from other atopic conditions?



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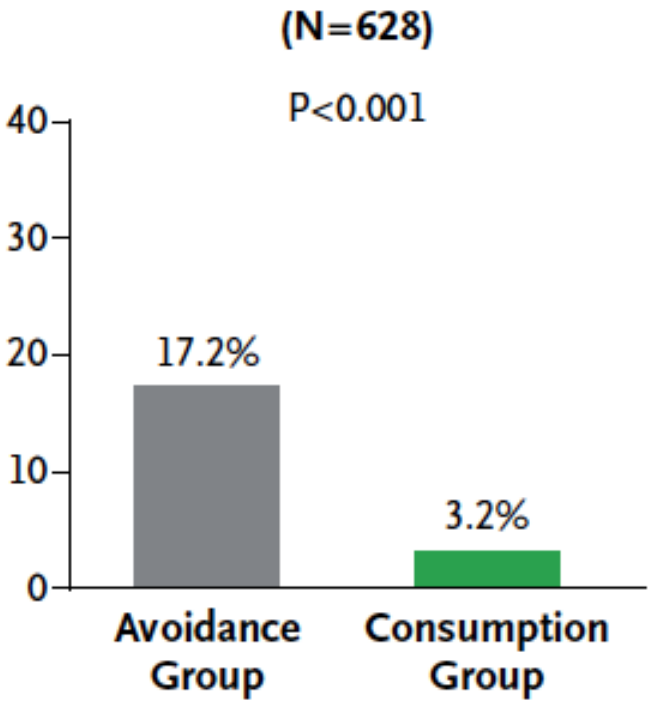
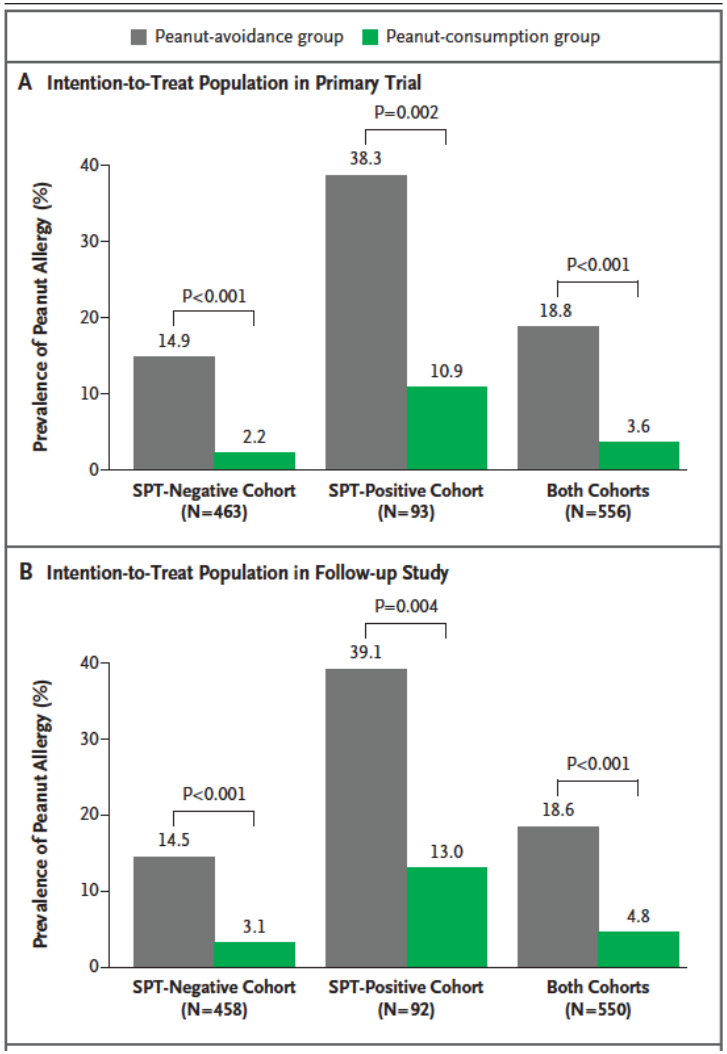
Can early exposure alter the risk of food allergy?

- LEAP Study





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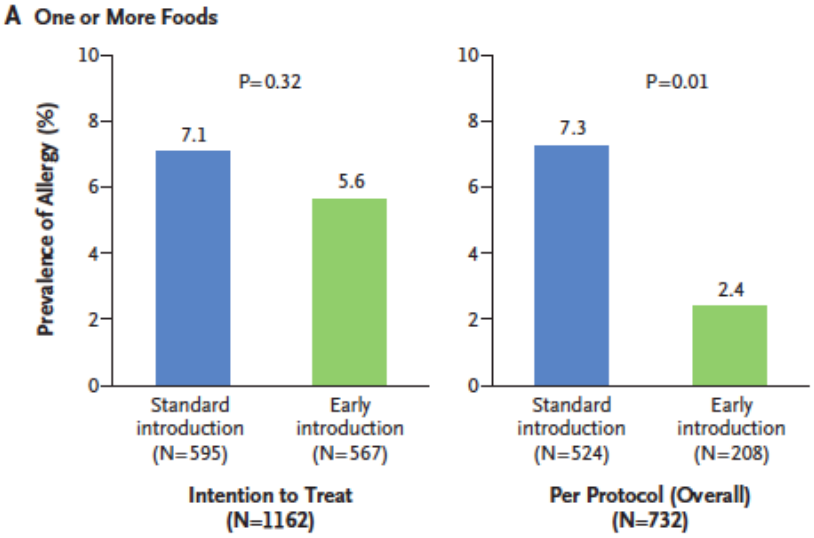
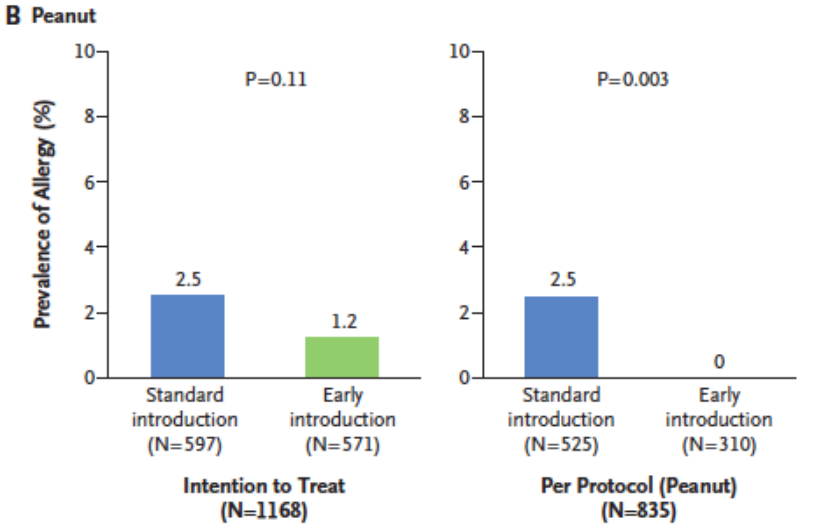
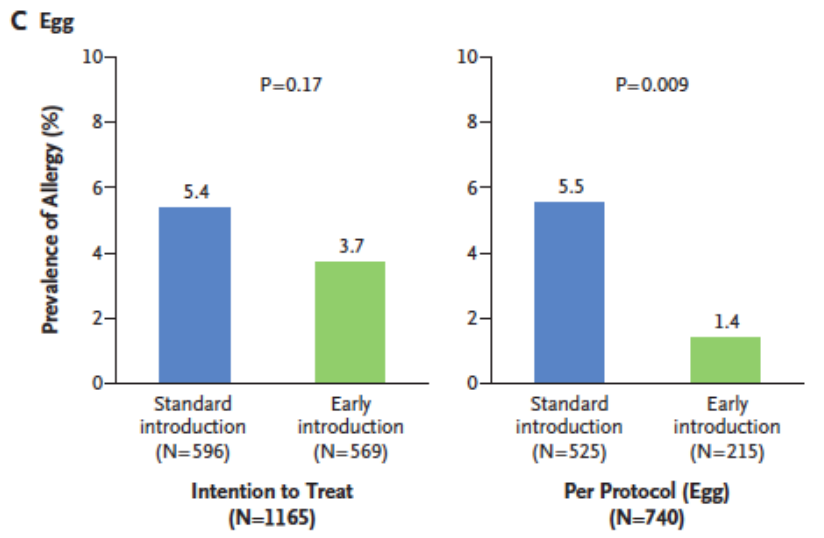
Can early exposure alter the risk of food allergy?

Other studies:

- Egg
- Multiple foods: EAT Study







A (na) phylaxis

Originates from Greek, meaning against or without protection.

vs. prophylaxis, for protection

"*A rapidly evolving, generalised multi-system reaction characterized by one or more symptoms or signs of respiratory, cardiovascular and other systems such as the skin and/or GI tract*."

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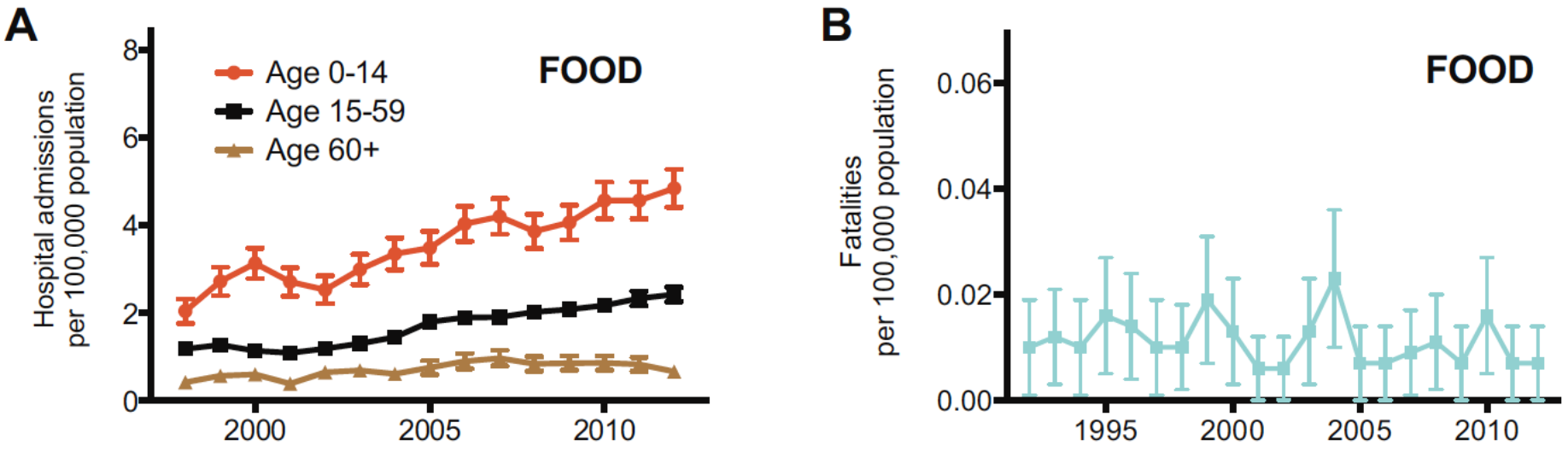
Food allergy is increasing...

1. Has the incidence of anaphylaxis increased?

2. Has mortality due to anaphylaxis increased?



Turner et al, JACI 2015

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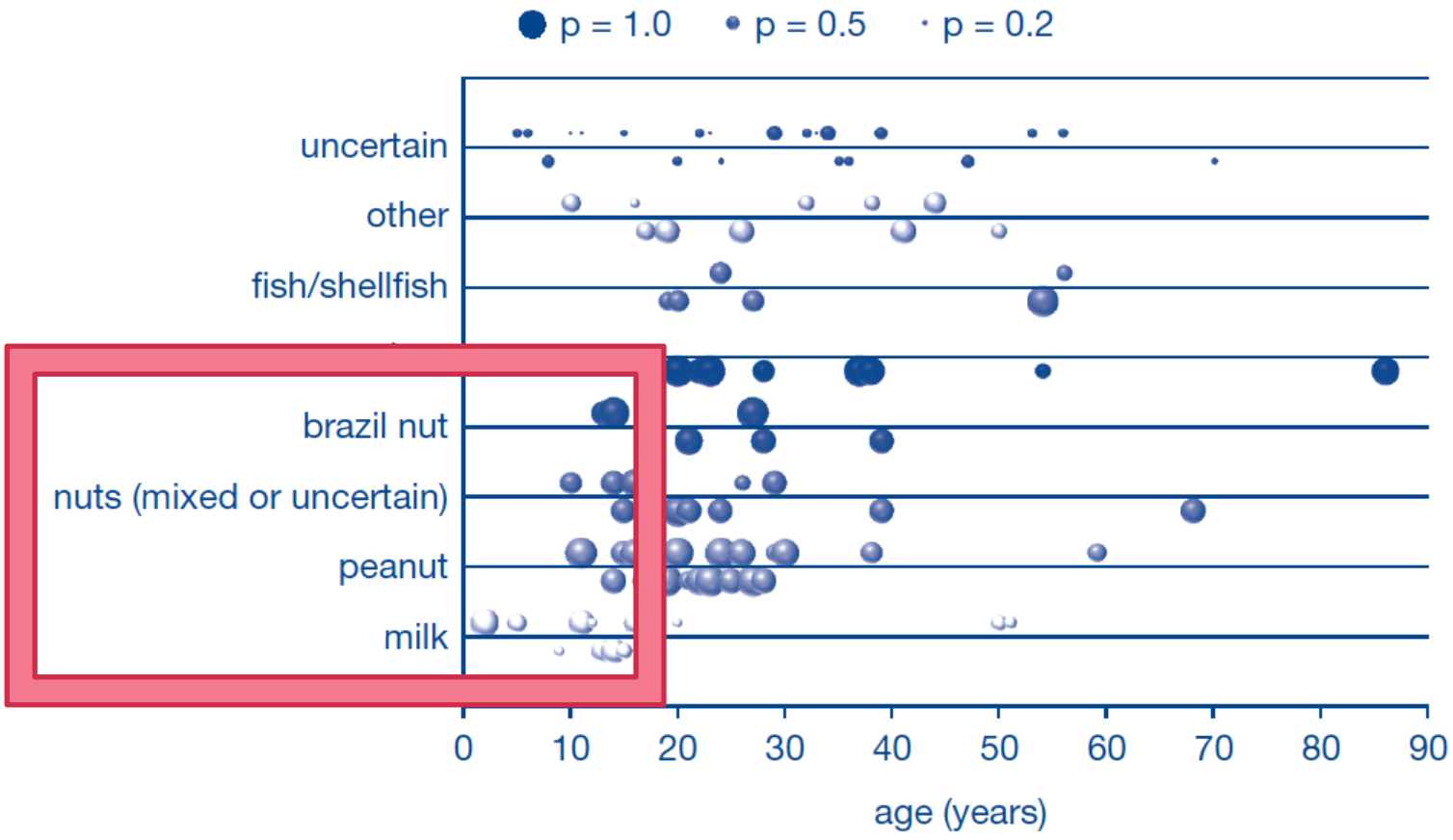
Fatal food anaphylaxis, UK 1992-2007



points 1992–1999 are plotted below the line
points 2000–2007 are plotted above the line

Data c/o
R Pumphrey

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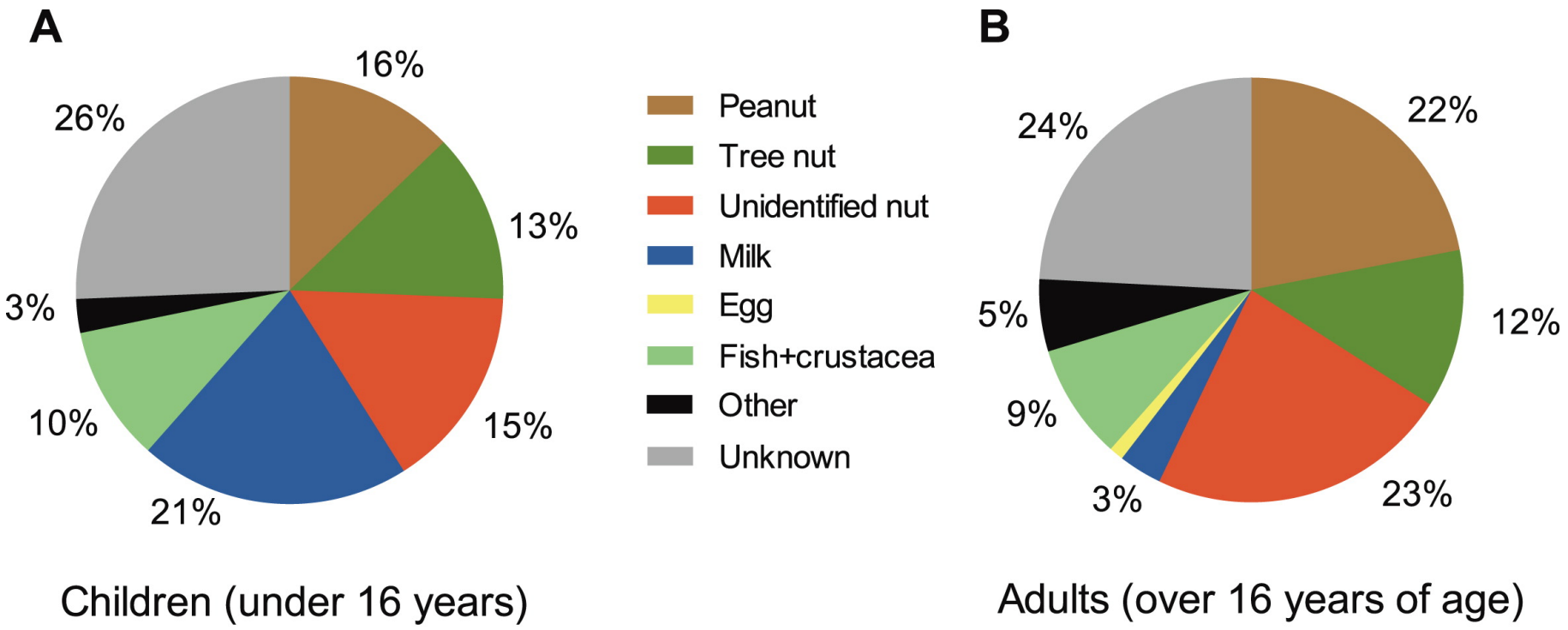
Fatal food anaphylaxis



Children (under 16 years)

Adults (over 16 years of age)

Turner et al, JACI 2015

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Where is the clinical need?

‘Perceived’ RISK	** DANGER **
	
Peanut	Cow’s Milk

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Where is the clinical need?

Pre-packed foods	Catering outlets
27%	**59%**
(? none to “traces”)	

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Risk of food-induced anaphylaxis

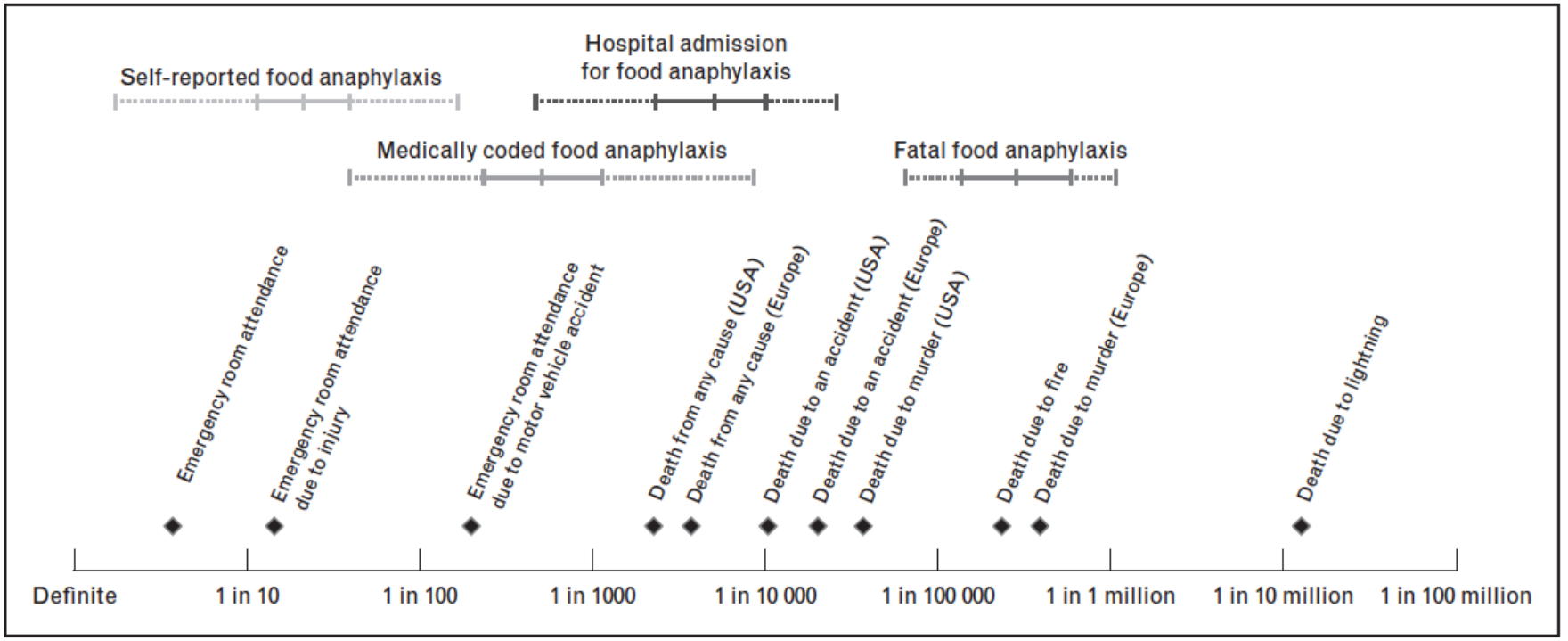

FIGURE 1. Annual incidence rate for different events in food-allergic people aged 0–19 years. Data are estimated risk of self-reported/medically coded/fatal food anaphylaxis and hospital admission for food anaphylaxis. Continuous bars represent means with 95% CI, dotted bars represent the range of point estimates from individual studies, in a systematic review undertaken by Umasunthar *et al.* [4▪]. Wherein reference risks vary markedly between European and US populations, they are stated separately. Otherwise, reference risks are for the US population.

Umasunthar et al, Clin Exp Allergy. 2013;43:1333-41.

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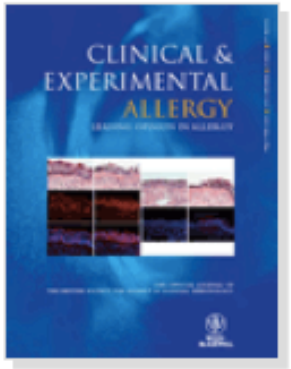
OBSERVATION:

Clinical & Experimental Allergy

Original Article

The use of adrenaline autoinjectors by children and teenagers

L. Noimark ✉, J. Wales, G. Du Toit, C. Pastacaldi, D. Haddad, J. Gardner, W. Hyer, G. Vance, C. Townshend, M. Alfaham, P. D. Arkwright, R. Rao, S. Kapoor, A. Summerfield, J. O. Warner, G. Roberts



Volume 42, Issue 2
February 2012
Pages 284–292

83% of (245) teenagers with anaphylaxis don't use their AAI

OBSERVATION:

Anaphylaxis is not uncommon,

but death from anaphylaxis is very rare.

Brown et al., MJA (2007)

Management

1. Dietary Avoidance
2. Treatment of accidental reactions
3. Desensitisation?

Management

1. Dietary Avoidance
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3. Desensitisation?

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Allergen Labelling

Table 1 Examples of countries with mandatory disclosure of allergens in pre-packed foods

	Wheat	Other gluten-containing cereals	Egg	Milk	Peanut	Tree nuts	Soy	Fish	Crustacean	Mollusc	Celery	Mustard	Sesame	Lupin	Sulphur dioxide	Other
Argentina [11]	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓[1]
Australia/ New Zealand [12]	✓	✓	✓	✓	✓	✓	✓	✓	✓	[2]			✓		✓	
Brazil [13]	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓[1]
Canada [14]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
China [15]	✓	✓	✓	✓	✓	✓	✓	✓	✓							
European Union* [16]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Hong Kong [17]	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	
Japan [18]	✓	[3]	✓	✓	✓	[3]	[3]	[3]	✓[4]	[3]						✓[3]
Kuwait/Gulf [19]	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓			
Malaysia [20]	✓	✓	✓	✓	✓	✓	✓	✓	✓							
Mexico [21]	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	
Singapore [22]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	
South Africa [23]	✓	✓	✓	✓	✓	✓	✓		✓	✓						
South Korea [24]	✓	[5]	✓	✓	✓		✓	[5]	✓[4]							✓[5]
USA [25]	✓		✓	✓	✓	✓[6]	✓	✓	✓						✓	
Codex [10]	✓	✓	✓	✓	✓	✓	✓	✓	✓							

Table adapted from http://farrp.unl.edu/IRChart with reference to national legislation.

*The 28 constituent member states of the European Union (EU) are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

[1] Local legislation also requires mandatory disclosure of tartrazine.

[2] It is unclear whether disclosure of mollusc is required by local legislation.

[3] Local legislation requires mandatory disclosure of eggs, milk, wheat, buckwheat, peanuts, shrimp and crab. In addition, disclosure is recommended (but not required) for the following 18 ingredients: abalone, squid, salmon roe, orange, kiwifruit, beef, walnut, salmon, mackerel, soybean, chicken, banana, pork, Matsutake mushroom, peach, yam, apple, and gelatin.

[4] Legislation specifies prawn/shrimp and crab rather than 'crustacea'.

[5] Local legislation requires mandatory disclosure of egg, milk, buckwheat, peanuts, soybeans, wheat, mackerel (but not other finned fish), prawn/shrimp, crab, pork, peaches and tomatoes. There are no allergens for which labelling is optional.

[6] Tree nuts in USA include a range of native nuts not included, for example, under EU legislation e.g. Beech, Butternut, Chestnut, Coconut, Ginko nut, Hickory nut, Lychee, Shea nut.

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Turner et al, BMJ 2011

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Impact on the consumer

- 69% of cereals and 56% of confectionery labelled 'may contain' despite not listing nut as an ingredient[1]
- Shopping for a nut-allergic person took:
  - 40% longer
  - cost an average of 11% more
- Adversely impacts on quality of life

[1]FSA report 2007, available at www.food.gov.uk/multimedia/pdfs/maycontainguide.pdf

	Product with PAL	Product without PAL
Helpful to allergic consumers	**1. Product with PAL with a real risk of inducing an allergic reaction i.e. unsafe to consume** • Proper risk assessment by the food manufacturer • Conclusion that the allergen may be present in the product (despite allergen management and Good Manufacturing Practice).	**4. Product without PAL with low or no risk of inducing an allergic reaction i.e. safe to consume** • Proper risk assessment by the food manufacturer • Conclusion that the allergen is not present in the product at a level that is likely to cause an allergic reaction
Not helpful to allergic consumers	**2. Product with PAL with unknown risk of inducing an allergic reaction i.e. may be safe or unsafe to eat** • No proper risk assessment • No conclusion about allergen presence can be drawn **3. Product with PAL with low or no risk of inducing an allergic reaction i.e. safe to consume** • Proper risk assessment undertaken • Manufacturer uses PAL nonetheless • No conclusion about allergen presence can be drawn	**5. Product without PAL, with unknown risk of inducing an allergic reaction i.e. may be safe or unsafe to consume** • No proper risk assessment • No conclusion about allergen presence can be drawn

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Do PALs contribute to anxiety?

- Paediatric food allergy causes more anxiety than other chronic diseases such as DM [1]

- Labelling is a particular concern: [2,3]

  "…considerable confusion over the extent to which parents should exclude allergens… including whether foods labelled "may contain traces" should be avoided…" [4]

[1] Avery et al, PAI 2003;14:378-82
[2] Cummings et al. PAI 2010;21:586-94;
[3] Sheth et al, Ann Allergy Asthma Immunol 2010;104:60-5
[4] Hu et al, Arch Dis Child 2007;92:771-5

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So why bother?

- PALs helpful if they provide reliable information, but use is widespread[1]
- Phrasing is confusing

[1]FSA report 2007, available at www.food.gov.uk/multimedia/pdfs/maycontainguide.pdf
[2]Imamura et al. PAI 2008;19:270-4

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Do allergic individuals heed PAL?

	UK (n=184)	Australia (n=246)
"May contain nuts"	80% avoid	75% avoid
"May contain traces of nuts"	60% avoid	45% avoid
"Does not contain nuts but made in a factory that uses nuts"	40% avoid	35% avoid
	Noimark et al. PAI 2009	Zurzolo et al. MJA 2013

But wording used bears no relation to risk of contamination[1,2]

[1]Pele et al. Food Add Contam 2007; 24:1334-44. [2]Hefle et al. JACI 2007; 120:171-6.

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The reality:

- Wide inconsistencies in labelling
- Foods can become contaminated with residues of allergenic foods at multiple points:
  - Harvesting on farms
  - Storage & transportation
  - Manufacture: shared equipment
- Measures to reduce cross-contamination not uniform across manufacturers

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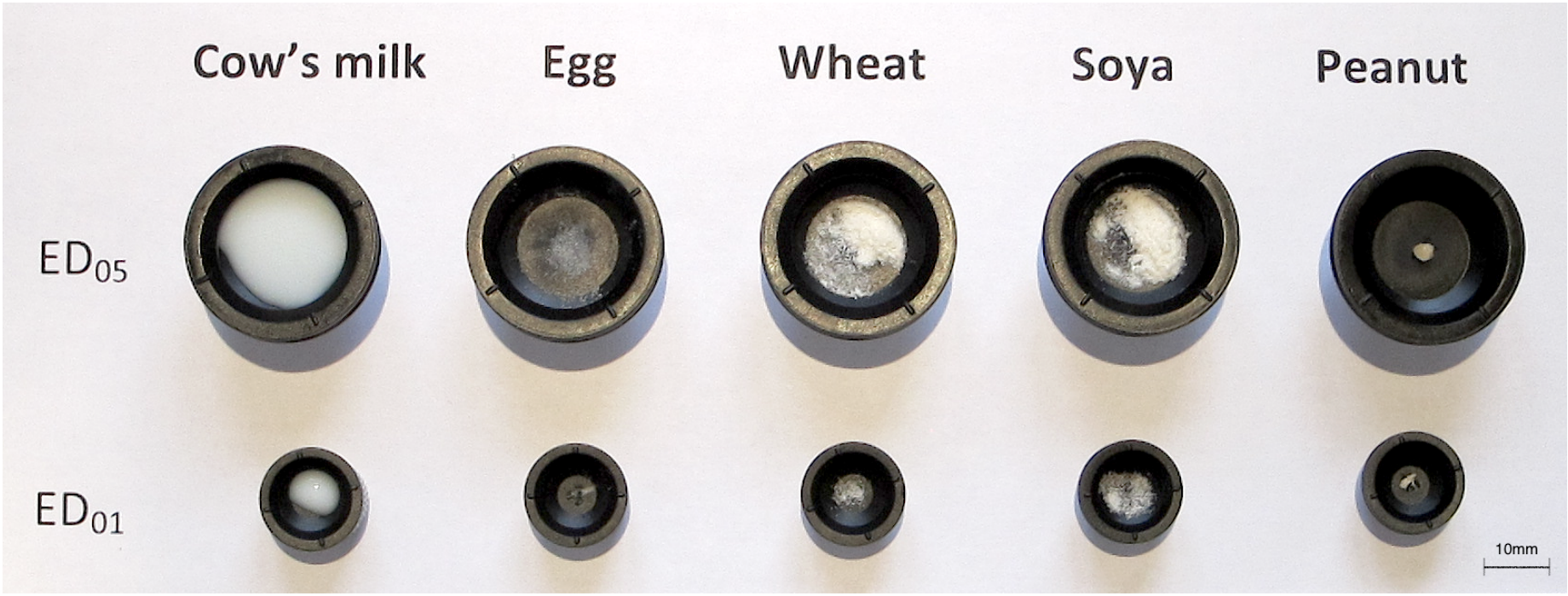
Not a trace!



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What do consumers want?

Label Type	Median
Not suitable for someone with X allergy	1
May contain traces of X	3
May contain	3
Packaged in a facility that also processes X	4
Manufactured on equipment that process X	5

n=623

DunnGalvin A. Impact of food labelling practices in individuals with food allergy. 2015

Management

1. Dietary Avoidance
2. Treatment of accidental reactions
3. Desensitisation?

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Accidental/inadvertent reactions are common:

- 1 in 8 peanut-allergic children experienced at least one accidental reaction every year[1]
- Over 50% of 512 infants had at least one reaction over 3 years follow-up[2]

Avoidance is, therefore, inadequate on its own

<u>All food-allergic children need:</u>

- Personalised Allergy Management Plan
- Rescue treatment (which may include AAI)

[1]Nguyen-Luu et al, PAI 2012; 23:133–139. [2]Fleischer et al. Pediatrics 2012; 130:e25–32.

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3. Desensitisation?

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Desensitisation - does it work?

British Journal of Nutrition (2014), **111**, 12–22
doi:10.1017/S0007114513002353

Systematic review with meta-analysis

Effectiveness and safety of orally administered immunotherapy for food allergies: a systematic review and meta-analysis

Ulugbek Nurmatov[1], Graham Devereux[2], Allison Worth[1], Laura Healy[1] and Aziz Sheikh[1]*

[1]*Allergy and Respiratory Research Group, Centre for Population Health Sciences, The University of Edinburgh, Medical School, Doorway 3, Teviot Place, Edinburgh EH8 9AG, UK*
[2]*Department of Child Health, Royal Aberdeen Children's Hospital, University of Aberdeen, Aberdeen AB25 2ZP, UK*

(Submitted 3 January 2013 – Final revision received 15 May 2013 – Accepted 19 June 2013 – First published online 15 August 2013)

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But is it safe as a routine treatment?

- OIT involves **an increased risk for allergic reactions**, including potentially **life-threatening symptoms** (bronchial/ laryngeal reactions, adrenaline use)
- OIT-related reactions are **largely unpredictable** (unrelated to cofactors/dose increases)
- **GI symptoms** are common - no effective treatment available
- **High risk patients:** patients with **persistent & severe allergy** do not fare well on OIT (high sIgE/SPT, asthma, bronchial/laryngeal $)
- **Strict long-term commitment & supervision** is required to ensure compliance & control of underlying allergic diseases (mainly **asthma**), especially in **teenagers**

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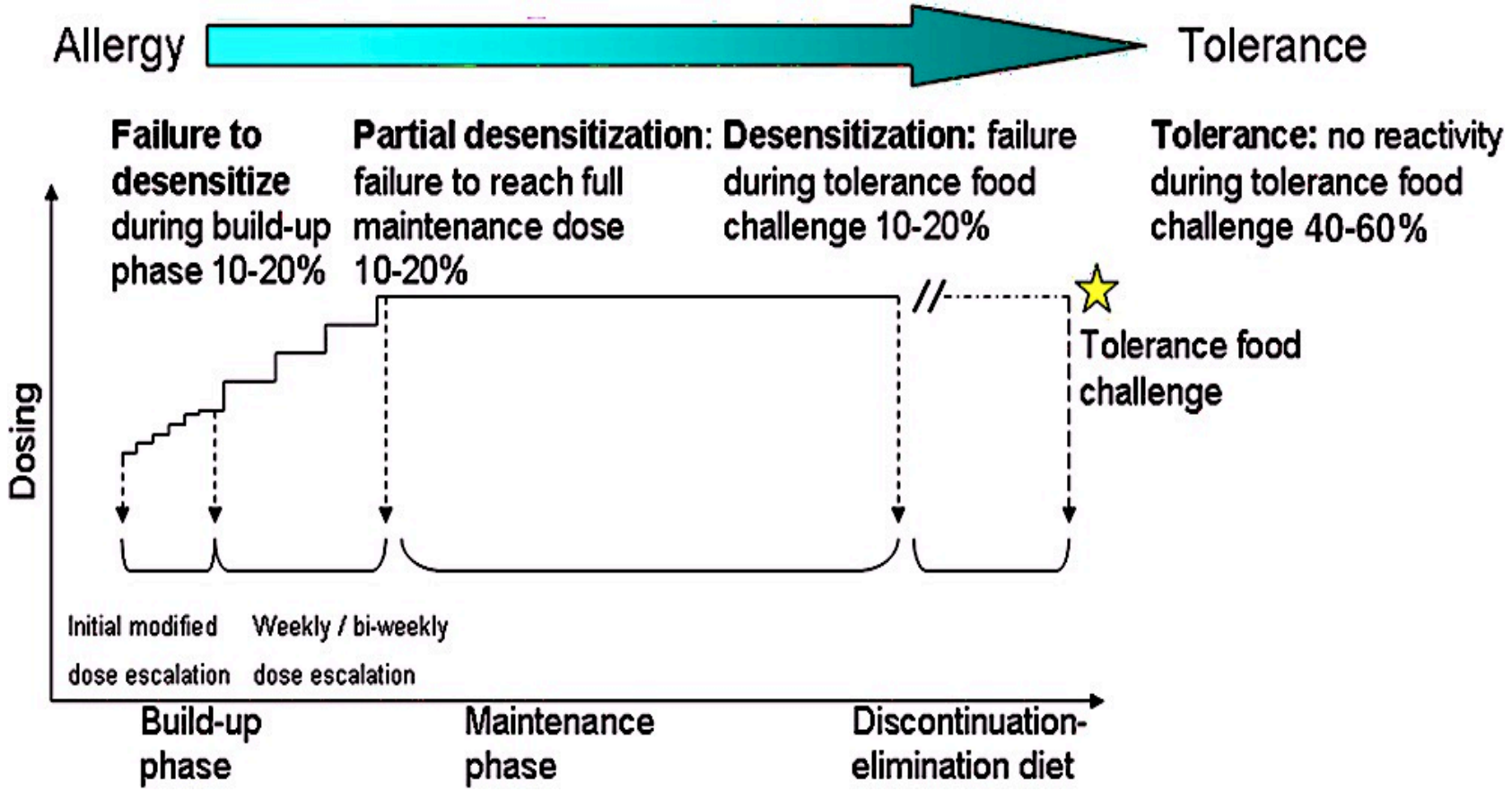
What happens after initial desensitisation?



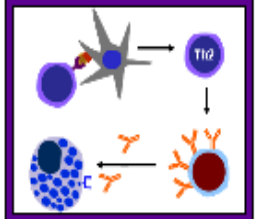
Nowak-Wegrzyn & Sampson. JACI 2011; 127(3):558-73

Imperial College London

Certificate of Advanced Study and MSc in Allergy

Modules and Short Courses

The Scientific Basis of Allergy

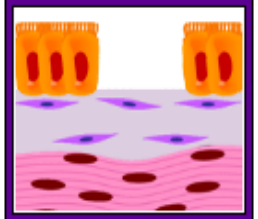


Module 1

Diagnosis & Treatment

Module 2

The Cutting Edge of Allergy



Module 3

Allergic Gastrointestinal Disease

Optional Module 1

Food Hypersensitivity

Optional Module 2

Allergic Airways Disease and Asthma

Optional Module 3

Rhinitis and Hayfever

Optional Module 4

Allergic Skin Disease

Optional Module 5

Paediatric Allergy

Optional Module 6

Research Skills

Dissertation Module

https://**www.imperial.ac.uk**/medicine/study/postgraduate/masters-programmes/**msc-pg-cert-allergy/**

Register your interest with our Course Administrator - **karen.davies@imperial.ac.uk**