



Food allergy and gut functioning

Harry Wichers

Agrotechnology and Food Sciences Group-FCH

Animal Sciences Group-CBI

Allergy Consortium Wageningen

Overview

Allergy Matters-ACW



- Allergies and their consequences
- Food allergies, legislation and labelling
- Cow's milk allergy
- Conclusions

Overview

Allergy Matters-ACW



- Allergies and their consequences
- Food allergies, legislation and labelling
- Cow's milk allergy
- Conclusions

What is an allergy-and what is not?

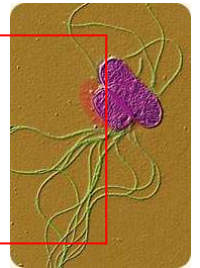
Allergy Matters-ACW



Adverse reaction to food

Non-toxic

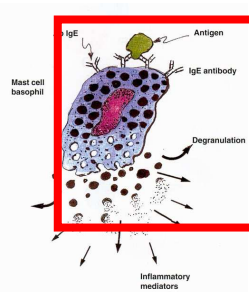
Toxic:
Salmonella, etc.



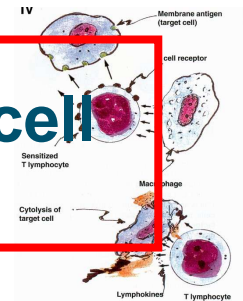
Intolerance:
lactase-deficiency, strawberry, additives

Allergic

IgE-mediated
Food allergy

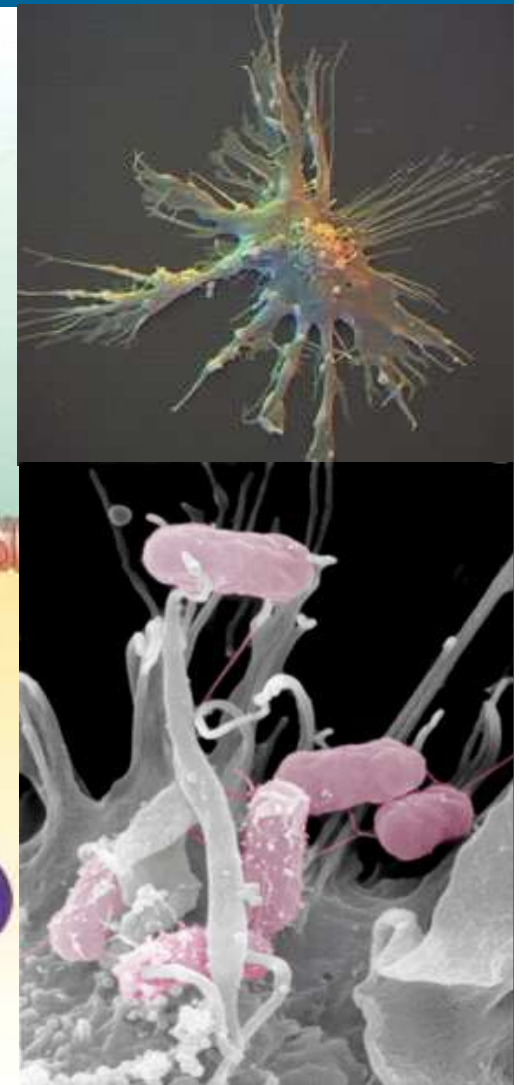
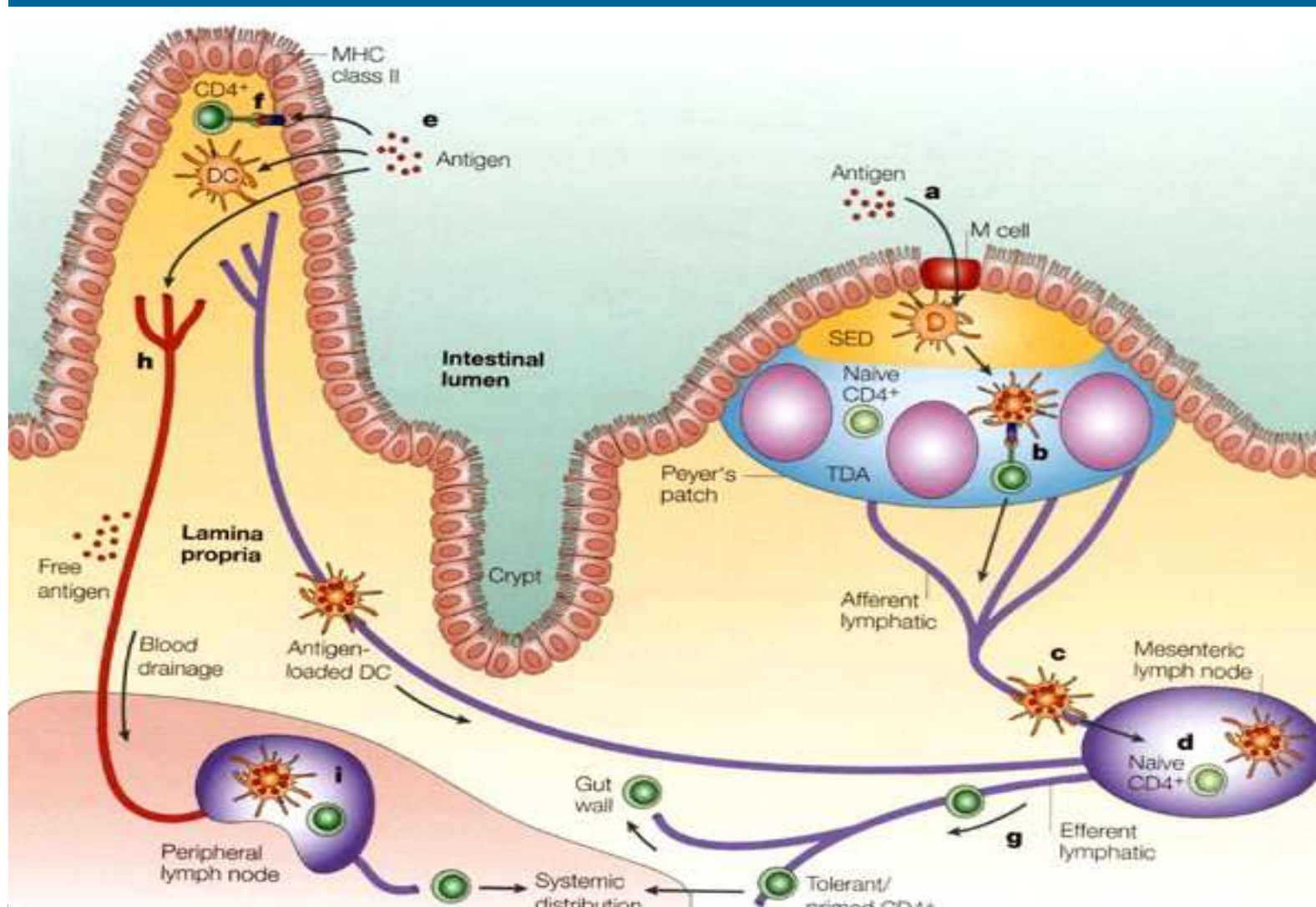


Direct effect on T-cell
Coeliac disease



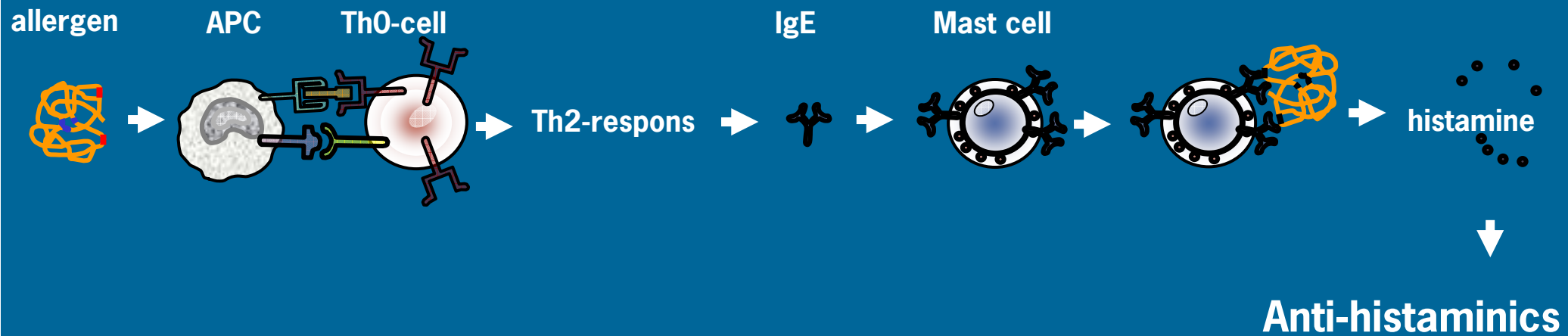
Gut immunity

Allergy Matters-ACW



Mechanism of allergic reactions

Allergy Matters-ACW

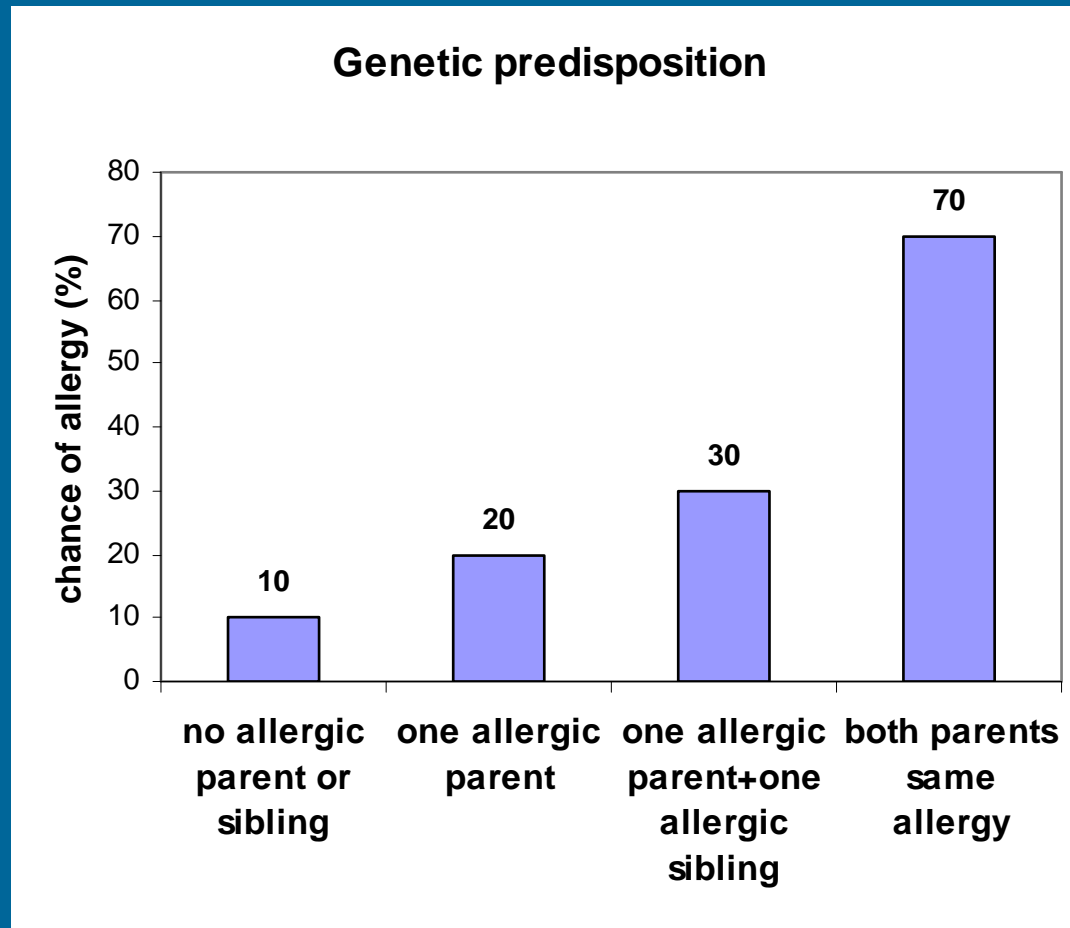


What is an allergy-and what is not?

Allergy Matters-ACW



*allergy = **heritability** x environment*



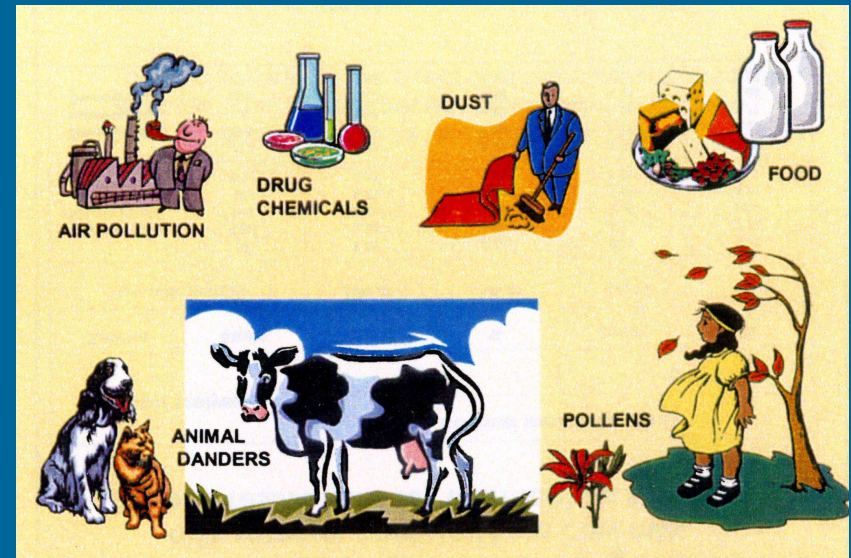
What is an allergy-and what is not?

Allergy Matters-ACW



*allergy = heritability x **environment***

food: faster market introductions
less processing
more resistant crops
complex food products



Allergic sensitisation:	19 % (1991)	→	27 % (1995)
Asthma:	4 % (1973)	→	9 % (1988)
Eczema:	5 % (1973)	→	16 % (1988)

Increase in allergy?

Allergy Matters-ACW

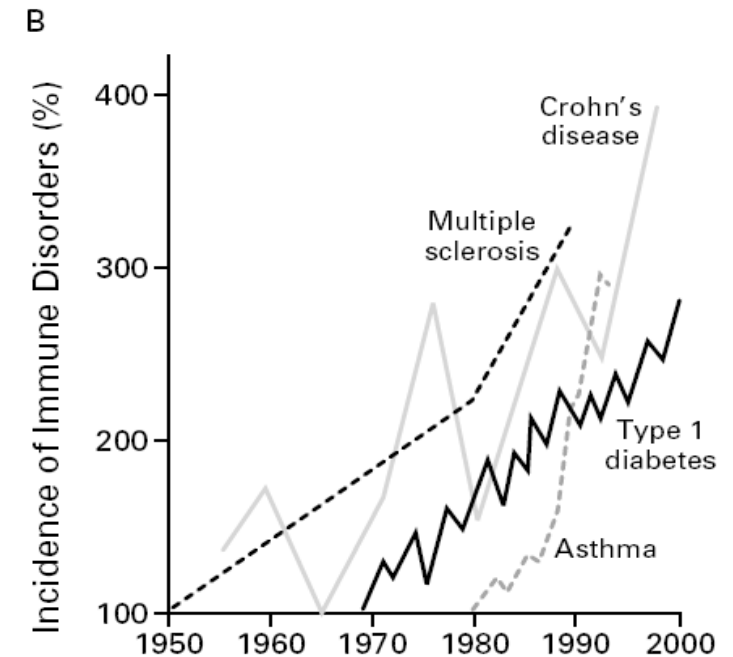
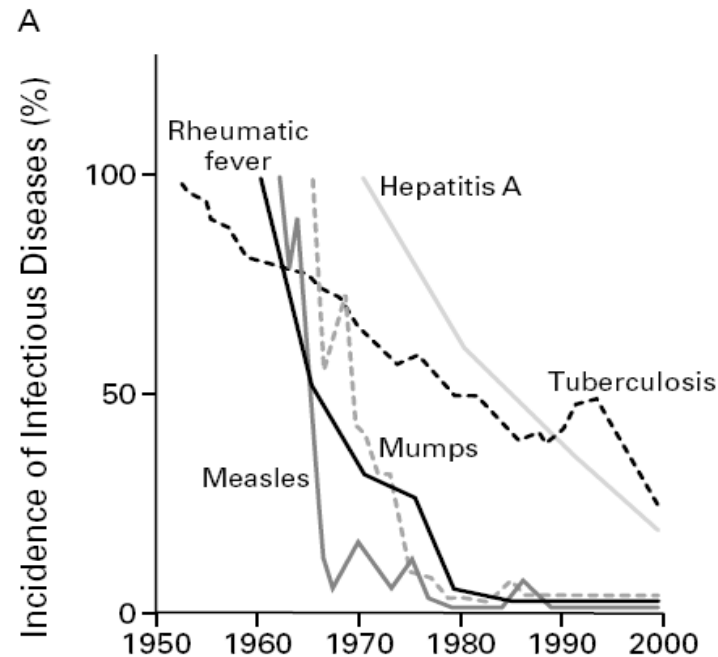


Allergic sensitisation:	19 % (1991) → 27 % (1995)
Asthma:	4 % (1973) → 9 % (1988)
Eczema:	5 % (1973) → 16 % (1988)



Netherlands:
1983 → 1994:
+4x asthma
increase (2%)

EU enlargement:
EU15: 373 M →
CEEC10: 104 M

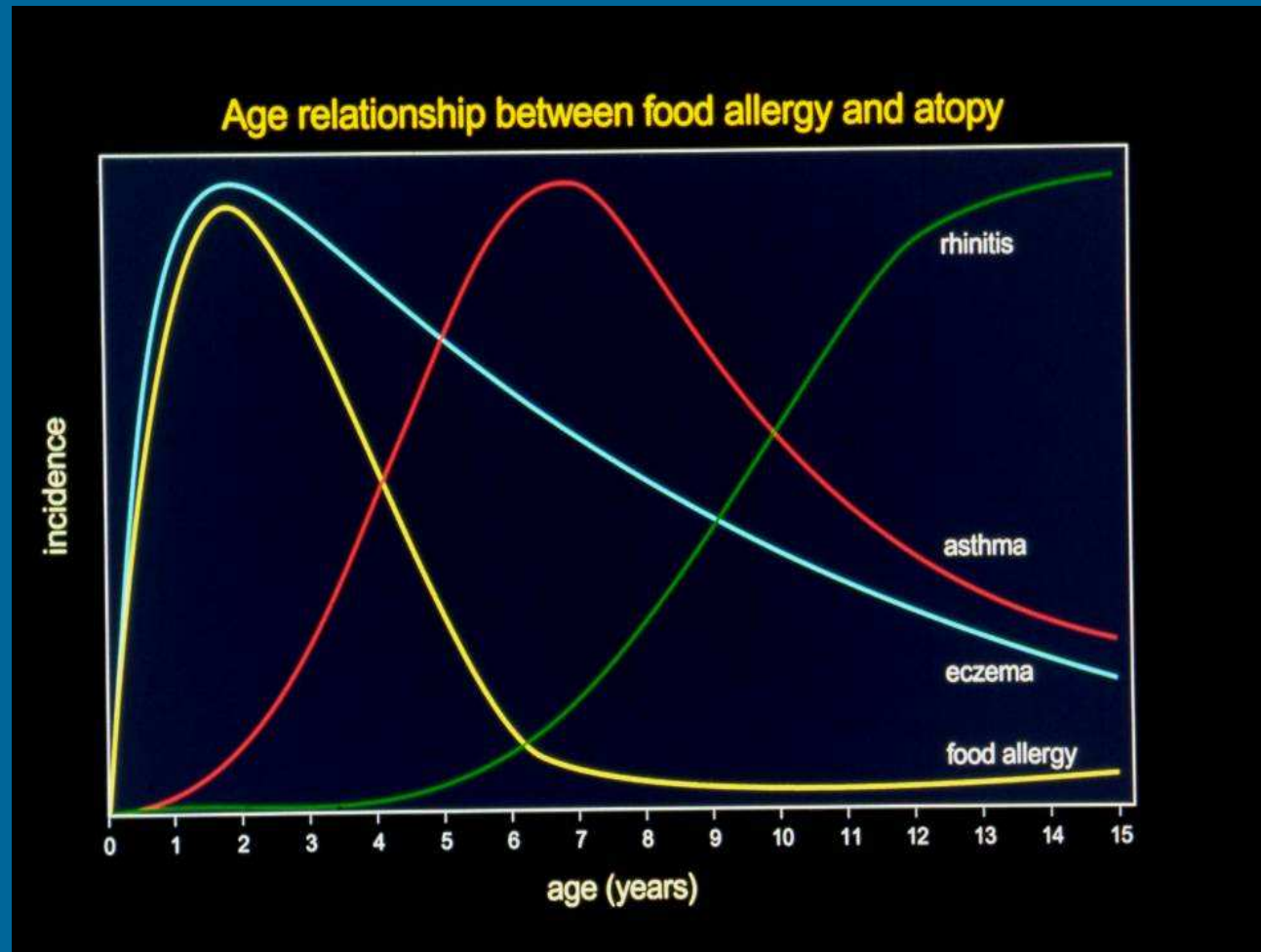


What is an allergy-and what is not?

Allergy Matters-ACW



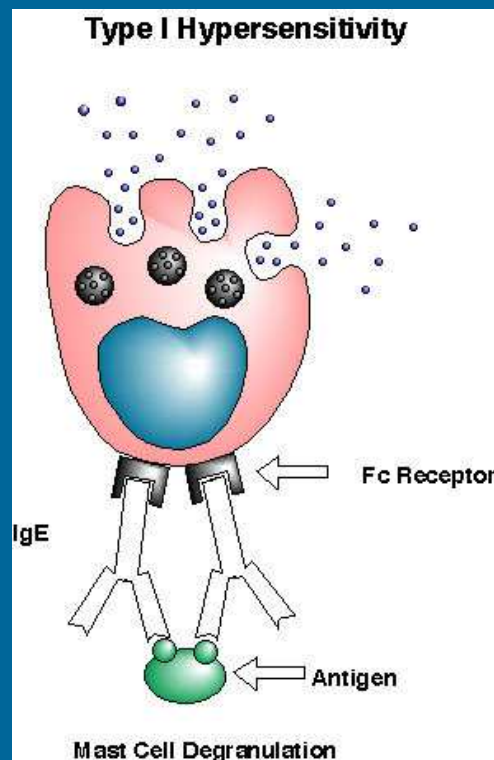
Allergic march





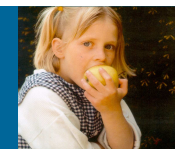
What is an allergy-and what is not?

- An allergy is *an adverse reaction to food, in which the immune system is involved*



What is an allergy-and what is not?

Allergy Matters-ACW



Socio-economic costs of allergic diseases

Allergy Matters-ACW



Direct costs

Hospital care

- Inpatient care
- Emergency services
- Outpatient services

Physician services

- Laboratory diagnostic services
- Medications

Indirect costs

School absence

Work day loss

Caregiver costs

Allergen-avoidance

Early mortality

**Price level 2007 and
EU-27:
> €50 billion!!**

€ 18.9 billion

+

€ 29.3 billion

Source: UCB-European Allergy White Paper

Allergy is more than immunology

Allergy Matters-ACW



Environment

Biogenic factors
infections, allergens

Anthropogenic factors
stress, food

Allergy is (more and more) an environmental disease

Biology of effector organs
immune system

Individual

Atopy
family history

***Allergy develops at the interface
between host and environment***

Overview

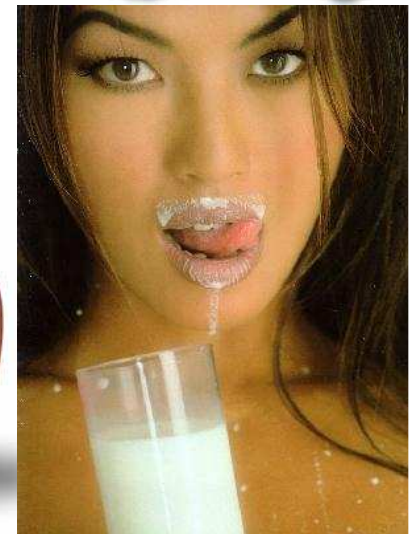
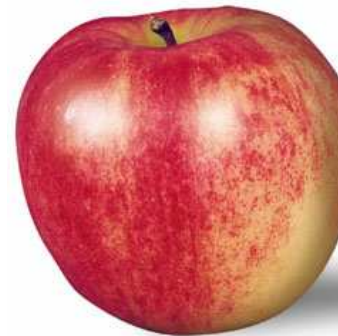
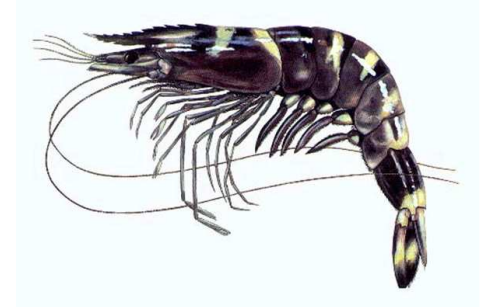
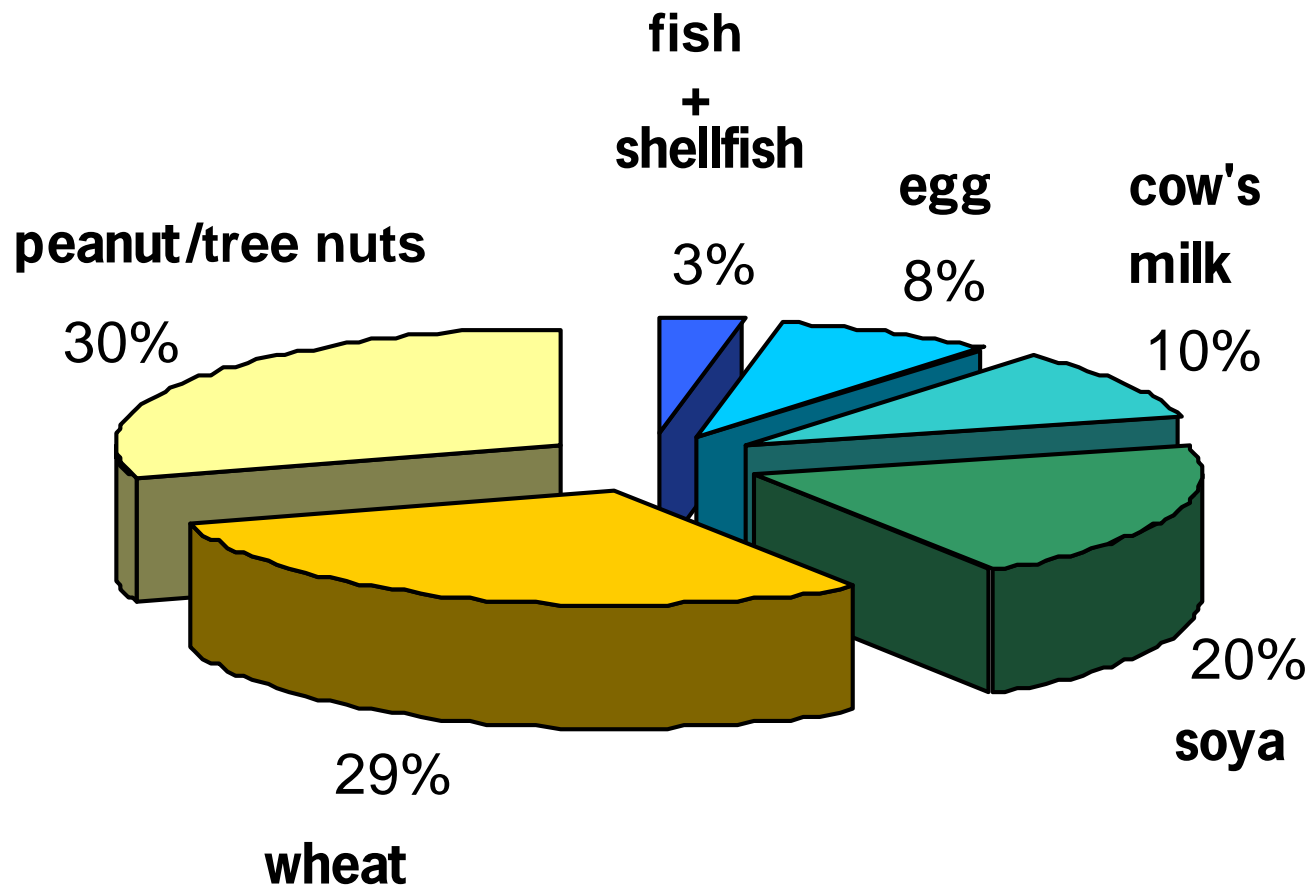
Allergy Matters-ACW



- Allergies and their consequences
- Food allergies, legislation and labelling
- Cow's milk allergy
- Conclusions

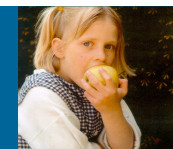
Big-8: the most important food allergies

Allergy Matters-ACW



Labelling directives

Allergy Matters-ACW



Buckwheat

Egg

Milk

Peanut

Cereals containing gluten

Tree nuts

Crustaceans

Fish

Soybean

Sesame seed

Sulphites

Celery

Mustard

Mollusks

Lupin

Japan & South Korea

USA

FALCPA

Canada

Australia

New Zealand

European Union

Labelling Directive 2003/89/EG

Overview

Allergy Matters-ACW



- Allergies and their consequences
- Food allergies, legislation and labelling
- Cow's milk allergy
- Conclusions

What causes the allergic reaction?

Allergy Matters-ACW



Structural basis of allergenicity

allergens

epitopes

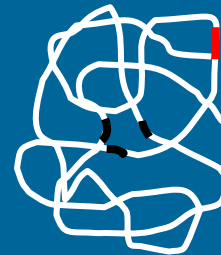
allergens

usually proteins



epitopes

“active” elements on the allergens



linear epitope

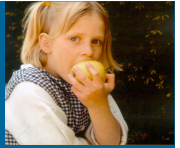
food allergens

conformational
epitope

*respiratory
allergens*

Allergens in cow's milk

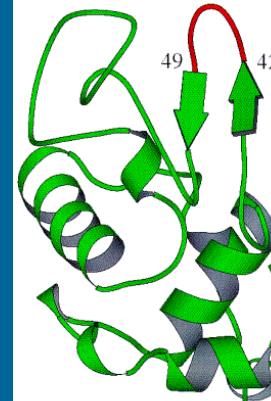
Allergy Matters-ACW



Casein (majority of protein)
 α , β , κ and γ (Bos d8)

Whey-proteins
 α -lactalbumin
 β -lactoglobulin (Bos d4 and d5)

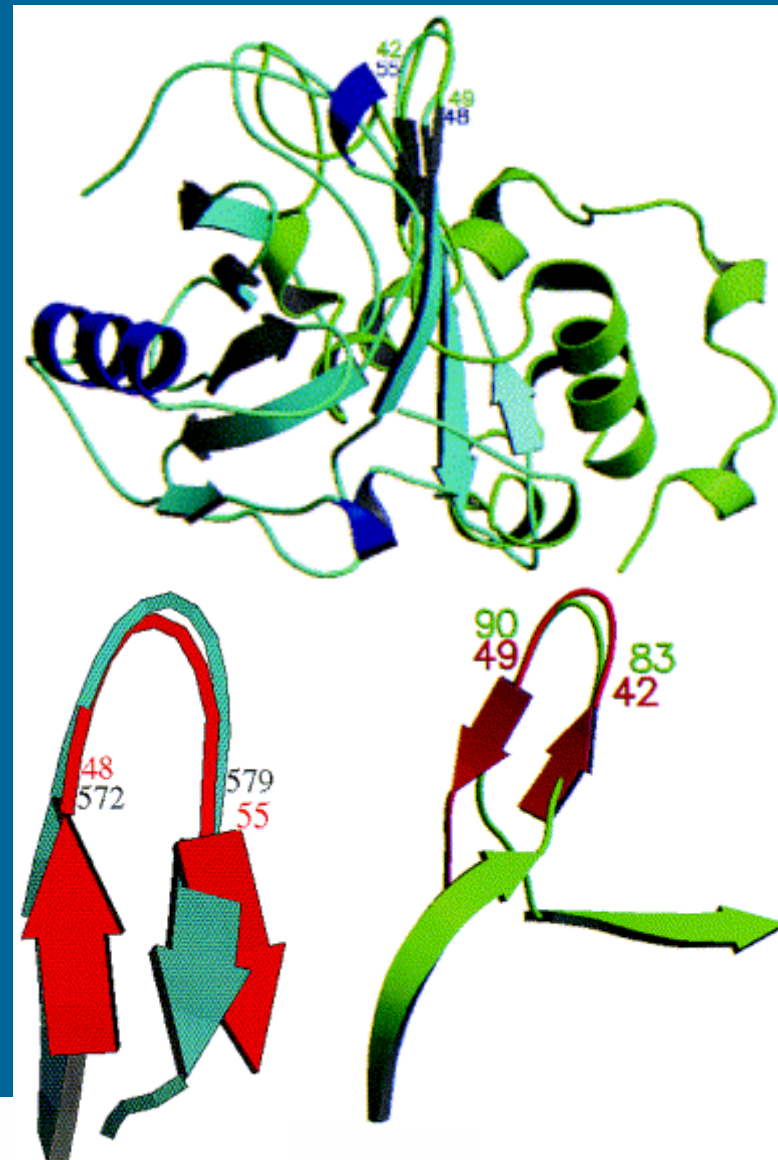
Allergy
Often and mostly with children
Usually outgrowth after 1-2 jaar
Prevalence: 5%
50% in VA⁺ children



Allergens in cow's milk: epitopes



Protein	Content (%)
<i>Caseins:</i>	
α_{s1} -casein	32
α_{s2} -casein	8
β -casein	32
κ -casein	8
	80
<i>Whey proteins:</i>	
β -lactoglobulin	12
α -lactalbumin	4
immunoglobulins	3
serum albumin	1
	20

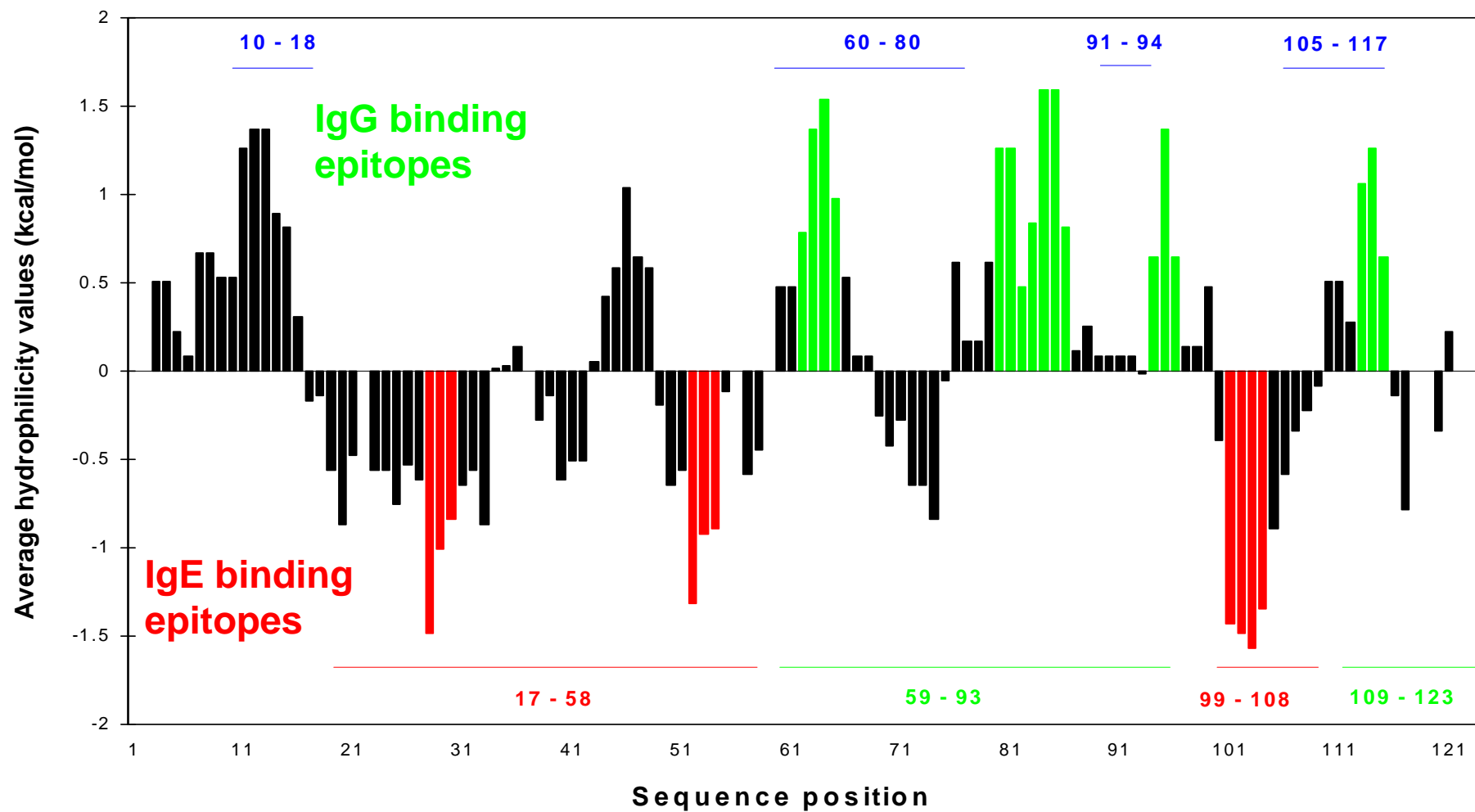


Allergens in cow's milk: neo-epitopes

Allergy Matters-ACW

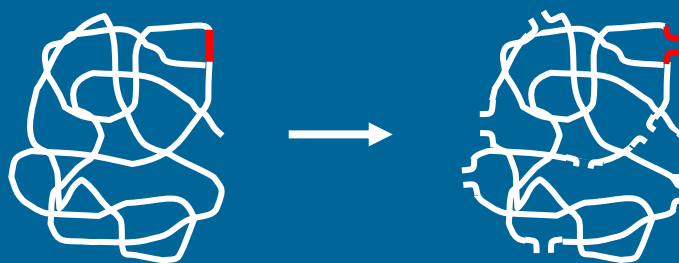


Hydrophobicity map of α -Lactalbumin



Allergens in cow's milk: proteolysis

Allergy Matters-ACW



Allergies: pre- and probiotics

Allergy Matters-ACW



- ☐ 1: [Allergy](#). 2005 Apr;60(4):494-500.

Comment in:

[Arch Dermatol](#). 2006 Sep;142(9):1201-3.

Probiotics in the treatment of atopic eczema/dermatitis syndrome in infants: a double-blind placebo-controlled trial.

[Viljanen M](#), [Savilahti E](#), [Haahtela T](#), [Juntunen-Backman K](#), [Korpela R](#), [Poussa T](#), [Tuure T](#), [Kuitunen M](#).

- ☐ 1: [J Allergy Clin Immunol](#). 2007 Jan;119(1):192-8. Epub 2006 Oct 23.

Probiotics and prebiotic galacto-oligosaccharides in the prevention of allergic diseases: a randomized, double-blind, placebo-controlled trial.

[Kukkonen K](#), [Savilahti E](#), [Haahtela T](#), [Juntunen-Backman K](#), [Korpela R](#), [Poussa T](#), [Tuure T](#), [Kuitunen M](#).

Skin and Allergy Hospital, University of Helsinki, Finland. kaarina.kukkonen@hus.fi



Allergies: immunomodulation

Allergy Matters-ACW



Immunomodulation ↔ “Technology”

Innate immunity

Hepatic acute-phase response

- Increased acute-phase proteins
- Decreased albumin synthesis
- Increased glycogenesis
- Increased gluconeogenesis
- Increased amino acid uptake

CNS responses

- Fever
- Myalgia
- Slow-wave sleep
- Anorexia

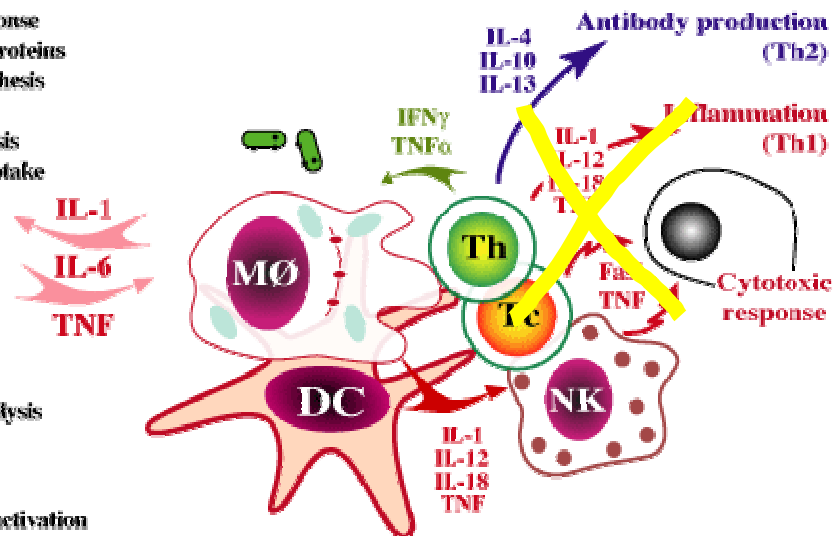
Tissue responses

- Increased muscle proteolysis
- Increased lipolysis

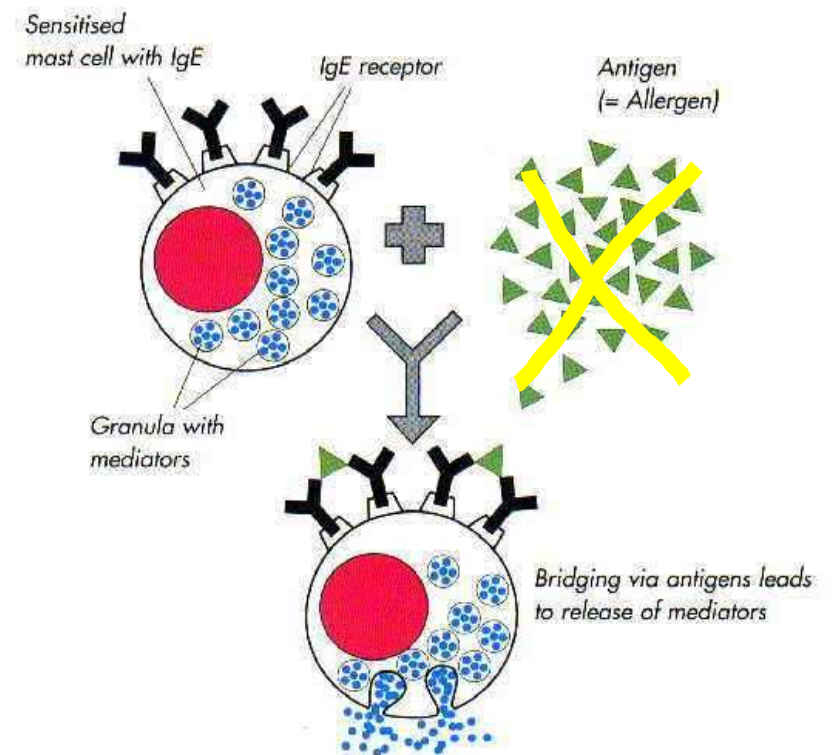
Immunological responses

- Increased macrophage activation
- Neutrophilia and neutrophil activation
- Trace mineral redistribution

Adaptive immunity



Bendtsen 2000



2

Allergens in cow's milk: cross-reactions

Allergy Matters-ACW



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 cashew, brazil, 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 avocado, watermelon, banana	92%
Latex* latex glove	Fruits avocado, kiwi, banana	35%
Fruits banana, kiwi, avocado	Latex latex glove	11%

Sicherer, JACI 108: 885 (2001)

Major allergen families

Classification using Pfam database:

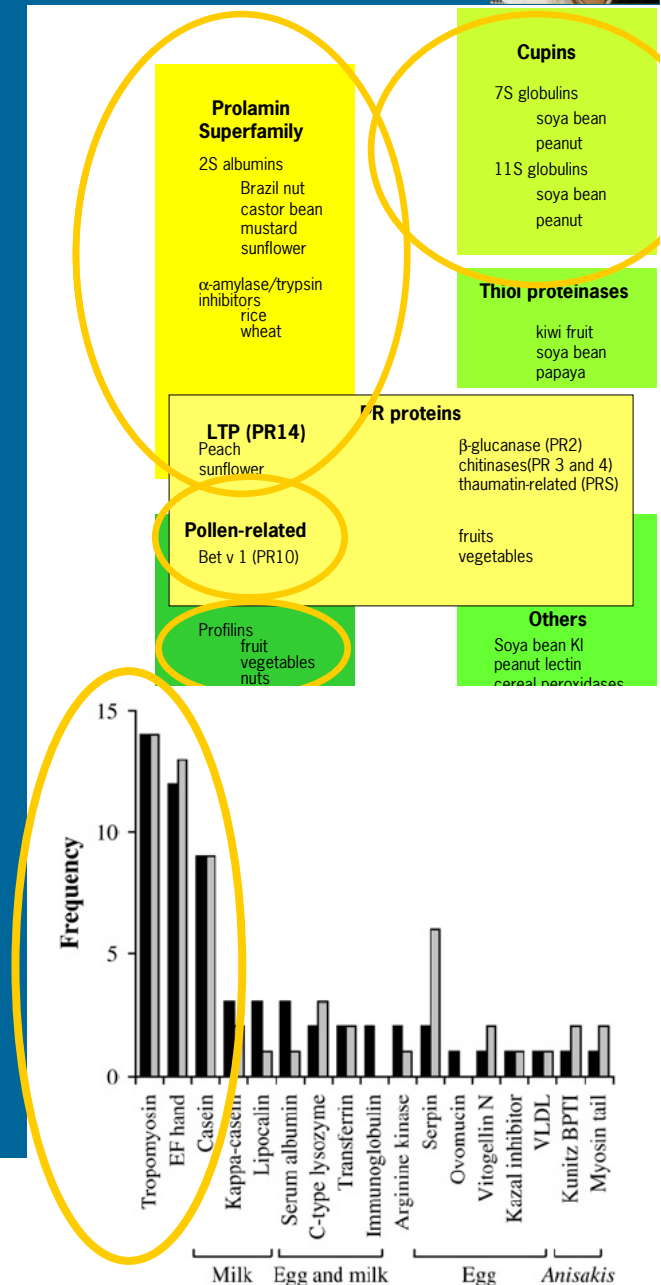
Plants: Pfam 7.3, contains 3849 families;
only 20 fam's contain allergens;
69% of allergens in **4 fam's**:

Cupins, LTP/2S-albumins, PR-10, profilins

Animal: Pfam 21.0, contains 8957 fam's;
majority of allergens in **3 fam's**:

Tropomyosins, EF-hand parvalbumins, caseins

Allergy Matters-ACW



Risk factors

Allergy Matters-ACW



Product recalls

Allergy Matters-ACW



Albert Heijn haalt 14 soorten vlees uit schap

Van onze verslaggeefster
AMSTERDAM

Albert Heijn heeft diverse soorten vleesbeleg uit de winkels gehaald. Het betreft onder meer chorizo, Ardenner filet, Griekse runderfilet, Yorkham, boterhamworst, kiprollade, knusperham en gebraden gehakt. Deze vleessoorten zijn de komende dagen niet bij Albert Heijn verkrijgbaar.

Op de etiketten staat ten onrechte een icoontje met informatie dat deze vleessoorten geschikt zijn voor mensen met een voedselallergie, terwijl dat vaak niet het geval is.

Het eten van dit vlees kan schadelijk zijn voor consumenten met een koemelk-, soja-, ei-, selderij- of mosterdallergie, en voor mensen met een allergie voor gluten of lactose. Albert Heijn waarschuwt deze klanten 'dringend' het vlees niet te eten.

Eerder deze week ontdekte een klant tegenstrijdigheden in de informatie op het etiket van Kempische ham, en mailde dit naar AH. De directie plaatste onmiddellijk een advertentie in de dagbladen, en ontdekte zelf dat de fout bij meer soorten vlees voorkomt.

Het vlees komt allemaal van dezelfde leverancier. De supermarktketen onderzoekt samen met de leverancier hoe dit heeft kunnen gebeuren, en hoe lang het probleem al speelt. Klanten die het product terugbrengen naar de winkel, krijgen hun geld terug.

In nieuwe advertenties waarschuwt de winkel ook voor deze dertien vleessoorten, en biedt Albert Heijn zijn excuses aan.

Volkscrant 060107

WAARSCHUWING!

Deze waarschuwing is van belang voor consumenten met een voedselallergie of voedselintolerantie.

Albert Heijn heeft besloten om met onmiddellijke ingang de volgende verpakte, gesneden vleeswaren uit de winkels terug te halen:

Naam op de verpakking	Kleur prijsetiket
AH chorizo	blauw/wit
AH chorizo grof	groen/wit
AH chorizo fijn	groen/wit
AH filet d'Ardenne	blauw/wit
AH Griekse runderfilet	blauw/wit
AH Yorkham gegrild	blauw/wit
AH blikboterhamworst	groen/wit
AH boterhamworst blik	blauw/wit
AH Ardenner kiprollade	blauw/wit
AH Ardenner kiprollade	groen/wit
AH gegrilde knusperham	groen/wit
AH gegrilde knusperham	blauw/wit
Gebraden gehakt (gele folie)	volledig wit

Consumptie van de betreffende producten kan uitsluitend schadelijk voor de gezondheid zijn van klanten met een koemelk-, soja-, ei-, selderij- en mosterd-allergie of een gluten- danwel lactose-intolerantie. Deze klanten wordt dringend verzocht het product niet te consumeren. Alle andere klanten kunnen het product wel gewoon consumeren.

Reden voor de maatregel is dat de etikettering van de allergie-informatie op de betreffende producten onjuist kan zijn. Zo kan er onjuiste allergie-informatie met betrekking tot koemelk, ei, selderij, mosterd, gluten en lactose vermeld staan. Op de achterkant van de verpakkingen van deze producten kan bovendien ten onrechte een koemelk- of glutenvrij-icoon staan.

Wij willen met nadruk stellen dat het consumeren van de producten voor consumenten zonder een voedselallergie of voedselintolerantie, geen probleem is.

Klanten die het product terugbrengen naar de winkel, ontvangen het aankoopbedrag retour.

Voor nadere inlichtingen kunnen consumenten contact opnemen met de gratis Servicelijn van Albert Heijn (0800 - 03 05).

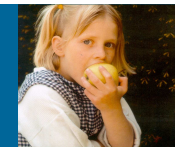
Wij bieden onze verontschuldigingen aan voor dit ongemak

Zaandam, 6 januari 2006
ALBERT HEIJN BV



Product recalls

Allergy Matters-ACW



Majority of recalls preventable, says UK consultancy - Microsoft Internet Explorer van Het Net

Bestand Bewerken Beeld Favorieten Extra Help

Vorige Zoeken Favorieten

Adres <http://www.foodnavigator.com/news/ng.asp?id=67602> Ga naar Koppelingen

Google Uitvoeren 308 geblokkeerd Spelling controleren Instellingen

FOOD
navigator.com | europe

Breaking News on Food & Beverage Development - Europe

[All our newsletters](#) **Free Newsletter** Your email OK

Lactose and Extruded Particulates
Sucrose replacer | Confectionary and Ice Cream | Soup, sauces etc

Home Europe
Home North America

Search
since
All

News Headlines Legislation

[Homepage](#) > [Legislation](#) > [Majority of recalls...](#)

[Email this page](#) | [Print in friendly format](#) | [News by email](#) | [Your comments](#)

Majority of recalls preventable, says UK consultancy
By staff reporter

10/05/2006 - The majority of food recalls around the world are caused by preventable problems, with poor allergen control and failure to follow international standards as the major culprits, according to a UK consultancy.

[Recalls](#) of foods can be expensive for food companies and importers. They can also damage a brand's reputation in the market.

Reading Scientific Services Ltd. (RSSL) reviewed about 200 recalls from around the world this year, documenting such incidents as a bird's head in a can of beans in the US, to benzene in soft drinks in South Korea and Europe.

Undeclared allergens prompted an astonishing 40 per cent of all recalls around the world, with over half of those occurring in the US.

We developed the peptide, that goes into the supplement,

DMV International
The ingredients of success

Gereed Internet

start Wallpaper 3 Microsoft Offi... Majority of recall... 13:15

Risk factors

- Proper labelling
- X-contamination
- Hidden allergens

Courtesy Clare Mills, IFR-Norwich

Allergy Matters-ACW



Overview

Allergy Matters-ACW



- Allergies and their consequences
- Food allergies, legislation and labelling
- Cow's milk allergy
- Conclusions



Conclusions

- Allergenicity of food is the resultant of many factors: individual predisposition, exposure, life style, food matrix and processing
- Options to reduce allergenicity of dairy products are very limited; strong impact on product characteristics
- Immunomodulation?
- Labelling legislation should be based on threshold dosage and exposure data
- HACCP offers better perspective than end-product control
- Zero-risk does not exist



Allergy prevention:

Strategies for

- *prevention*
- *symptom reduction*
- *management of an allergy*

www.allergymatters.org
www.allergie.wur.nl

Thanks for your attention!