

# Dairy and allergies

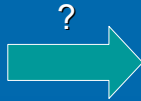
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## Aims of presentation

1. outline the biological mechanisms of allergic reactions
2. examine the evidence that exposing infants to dairy products causes them to develop allergies
  - Theories
  - Empirical Evidence
- examine the evidence that dairy products exacerbate allergic symptoms in adults

## Do dairy products lead to allergies?



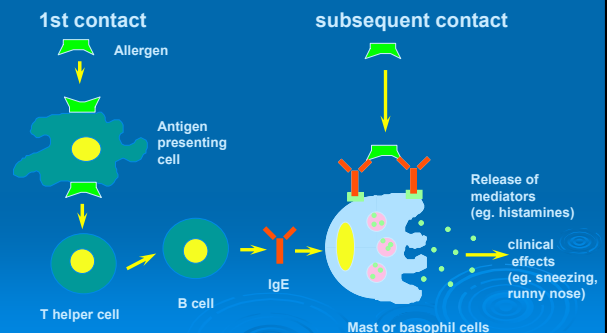
## What are allergic reactions?

- Immune systems role is to protect against infection and tumors
- The immune system utilizes both cellular (macrophages) and humoral factors (immunoglobulins) to eliminate potential threats
- Allergic reactions are inappropriate response from the immune system to protein
- Proteins that are eaten, touched, inhaled or injected (venom) may all induce an allergic reaction

## Clinical manifestations of allergic reactions

- Atopic asthma
- Eczema
- Allergic Rhinitis (Hay fever if from pollen)
- Food allergies (vomiting/diarrhea)
- Urticaria (hives)
- Anaphylaxis

## Process of sensitization



## Burden of Disease

- Prevalence of current symptoms of atopic disease – 6-7 year old Melbournians (2002)
- Wheeze 20.0% (18.4%–21.8%)
- Eczema 17.2% (15.7%–18.8%)
- Rhinitis 12.7% (11.1%–14.5%)

Robertson et al. (2004)

## Burden of disease - Asthma

- Most common respiratory disease
- One of the highest prevalence in the world
- A major cause of disability in the community
- Mortality is higher than most comparable countries
- High Cost to the community
- Identified as a national health priority area

## Causes of allergies

- Genetic susceptibility
- Intra and extra uterine environment
- Western lifestyle
- Avoidance of respiratory infection?
- Indoor exposure to allergens such as Der p 1, fungi and pets
- Environmental tobacco smoke (cause or effect modifier?)
- Air pollutants-effect modifiers?
- **Maternal and infant dietary factors?**

## How common is cows milk allergy in infants?

- Food challenge verifiable cow's milk allergy 2-5% of total population
- Parental perception of dairy allergy is more common
  - Approximately only 1/3 of children with parentally perceived cow's milk allergy have verifiable allergy or intolerance

Eggesbo et al. 2001

## Proteins present in dairy that could induce allergic reactions

- $\beta$ -lactoglobulin
- $\alpha$ -lactalbumin
- Albumin
- Lactoferrin
- immunoglobulins

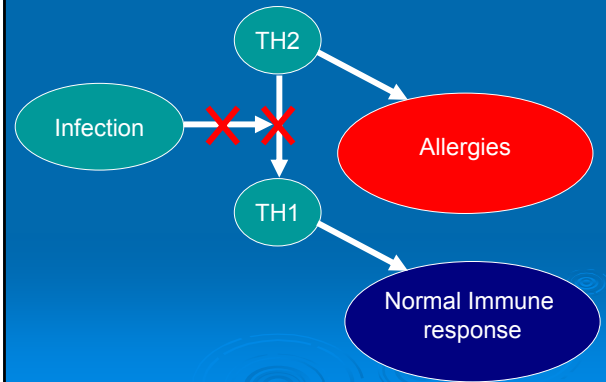
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## Does early infant exposure to dairy foods cause allergies?

- Why could introduction of dairy products increase (or decrease) risk of allergies?
- Theories that propose a relationship
  - Hygiene Hypothesis
  - Omega 3 and Omega 6 fatty acids
  - Number of proteins exposed to in first months

## Theory 1. Hygiene Hypothesis



## Implications of Hygiene Hypothesis

- Breastfeeding (dairy avoidance) reduces early infections
  - – increased risk of allergies?

## Theory 2. Omega Fatty Acids

- Omega 3 & 6 are associated with number of positive health outcomes
- Proposed that high concentrations of  $\omega$ -3 &  $\omega$ -6 fatty acids in human breast milk may reduce the risk of allergies
  - Or increased ratio between  $\omega$ -6/ $\omega$ -3
- Current evidence is mixed

## Theory 3. Number of proteins infant exposed to

- Proteins from maternal diet pass unrefined into breast-milk within 3-6 hrs in 50% of women
- Exclusively breastfed infants may be sensitised to food proteins
- Breast fed infants may be exposed to a wide variety of proteins
- Formula feeding may be more limited and consistent range of potential allergens

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## Evidence of association between infant exposure to dairy and allergies

- Evidence from three sources
  - Effect of brief early exposure (2 RCTs)
  - Effect of hydrolysed formula (2 meta analyses)
  - Observational studies comparing breast-feeding to formula feeding (unpublished review)

## Effect of brief early exposure to dairy

- Testing “dangerous bottle” hypothesis
- 2 Double blinded Randomised Controlled Trials (RCTs) - de Jong et al.(1998) & Schmitz et al.(1992)
- Early (first weeks of life) and Brief (only for a few days or a week)
- Results
  - No increased risk of allergies by 12 months
    - de Jong et al. RR=1.07 (95%CI=0.79-1.47) n = 1533
    - Schmitz et al. RR = not stated, n = 256
  - No increased risk of allergies by 2 years
    - de Jong et al. RR = 0.94 (95%CI=0.67-1.32)
    - Schmitz et al. RR = not measured

## Effect of hydrolysed cow's milk based formula

- Hydrolysing formula breaks proteins into smaller molecules
- Aims to reduce allergenicity
- Number of RCT's performed
- 2 Systematic Reviews conducted and results combined into meta analysis

## Meta analysis 1 – Ram et al.

- Only assessed “wheeze” or asthma as outcome
- Included studies of “high risk” infants
- 6 RCT's fulfilled inclusion criteria
- Follow-up reported to max of 96 months of age
- Results
  - Hydrolysed formula associated with less “wheeze”, RR =0.40, 95%CI (0.19 - 0.85)
  - Limited data for child-hood prevalence

## Meta analysis 2 – Osborn & Sinn

- Assessed all signs of atopic manifestation (skin, respiratory, gastrointestinal)
- Included studies of both “high and low” risk infants
- 18 randomised or quasi randomised trials fulfilled inclusion criteria (5 adequate method)
- Follow-up reported to max 60 months of age
- Results
  - Hydrolysed formula associated with less atopy during infancy, RR=0.65 95%CI (0.53 – 0.81)
  - Limited data available for child hood prevalence

## Cow's milk formula versus breast-feeding

- Breast feeding is associate with a myriad of health benefits
- Therefore ethically & practically difficult to conduct a RCT with allocation to breastfeeding or cow's milk formula from birth
- Need to rely on non-randomised cohort studies

## Cohort studies comparing formula to breastfeeding

- unpublished review of 10 cohort of respiratory symptoms
- Only examined long-term development of allergies (seven years or longer)
- Results
  - 3 showed breastfeeding to be protective,
  - 3 showed no relationship,
  - 4 showed breastfeeding to be a risk factor
    - methodological strength of the articles identifying breastfeeding as a risk for atopy are at least as strong as that of the studies that show a protective effect

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## Do dairy products increase symptoms of allergies in adults?

- General Population
  - 19% (16-22%) of Melbournians stated they reacted to some foods
  - 10.4% (6-17%) of these listed dairy as the food
- Individuals with Atopy
  - 61% (52-69%) of patients from an Asthma and Allergy Clinic said they had modified their diet to minimise allergic symptoms
  - Dairy products were one of the most commonly avoided foods
- Is this justified?

## RCT of the effect of Cows milk challenge

- 20 asthmatic adults, all with negative skin-prick-test to cow's milk
- 50% of the sample believing they reacted to dairy
- Randomised to drinking 300 ml of cow's milk or control drink, then the other drink 4 days plus latter
- Results
  - Dairy was not associated with exacerbation of asthma symptoms
  - Consistent with earlier work: dairy products can induce allergic symptoms, but only in patients with a strong positive skin prick test to milk

## Conclusions

- There is a strong public perception that dairy products are associated with the development and exacerbation of allergic symptoms
- Proteins in dairy foods can induce an immune response
- Only 2-5% of infants actually have allergic reactions to dairy products
- In the absence of a positive skin prick test, the perception of allergic reactions to dairy products does not always equate to a real immune reaction.

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