Allergy: Prevalence and identification of focus areas within prevention

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Contents

• What are allergies?

• Are the prevalence of allergies increasing?

• Why do we get allergies?
What Are Allergies?

“Situations where hypersensitivity results from heightened (or ‘altered’ reactivity of the immune system in response to external or ‘foreign’ substances”

”The allergic march in childhood”

- Atopic Dermatitis/ Food Allergy
- Allergic Rhinitis
- Asthma

Prevalence vs. Age (years)
Allergic rhinitis is a chronic inflammatory disease of the upper (and lower) airways induced by IgE-mediated allergic reactions against inhalant allergens e.g. from pollen, dust mites, and animals.

The Allergic Salute

Symptoms of allergic rhinitis
- itchy nose and sneezing
- stuffy and runny nose
- tiredness, headache
- decreased quality of life

- Are the prevalence of allergies increasing?
Self-reported allergic rhinitis and asthma within last 12 months in nation-wide representative surveys in Denmark

Trends of allergy (IgE sensitisation) among 15-41-year-olds in Copenhagen

Linneberg, JACI 2000
Prevalence of sensitization to aeroallergens in Copenhagen from 1976 to 2001 (n=7,820)

![Graph showing prevalence of sensitization to aeroallergens by age and year.](Linneberg, Clin Exp Allergy 2007)

Prevalence (95% CI) of atopy (IgE sensitisation) in 13-14-year-olds in Switzerland between 1983 and 2001

![Graph showing prevalence of atopy by year.](Braun-Fahrländer, Eur Respir J 2004)
Trends in European children?

• Continuing increase in Austria from 1995 to 2003
  Schernhammer, Pediatr Allergy Immunol 2007

• Continuing increase in Wales from 1973 to 2003
  Burr, Thorax 2006

• Why do we get allergies?
Affluence

- In 1873, Charles Blackley demonstrated that pollen was the causative agent of Hay fever

- He noted that
  
  "hay fever is a rare disorder restricted to the privileged class"
Westernization

Trends of allergy among schoolchildren in Leipzig (former East Germany) from 1991-92 to 1995-96

Von Mutius, Lancet 1998

Urbanization

Prevalence of self-reported allergy in Denmark

National Institute of Public Health
What happens when a population adopts a westernized, urban, and affluent lifestyle?

Prevalence of allergy (specific IgE in serum) in Greenland between 1987 and 1998

Krause, Lancet 2003
Why is allergy increasing?

Genes

Environment

- Air pollution
- Allergen exposure
- Hygiene hypothesis
- Indoor climate
  .. and more

Number of Siblings and risk of allergy:
the birth of the Hygiene Hypothesis

Test for trend: $P < 0.01$

Linneberg et al, Clin Exp Allergy 2001
Hygiene Hypothesis
Changes in microenvironment

- Reduced stimulation of regulatory T-cells
- Antibiotics
- Family size
- Farm environment
- Endotoxin
- Parasites
- Sterile foods
- Changed intestinal flora

Western lifestyle

Allergy
Hygiene Hypothesis
Changes in microenvironment

- ↓ Farm environment
- ↓ endotoxin
- ↓ parasites
- ↓ family size
- ↑ Antibiotics
- Changed Intestinal flora
- ↓ exposure to allergens
- Reduced stimulation of regulatory T-cells
- ↑ sterile foods

Allergy

Is the exposure-sensitization curve "bell"shaped?

Risk for sensitisation

Indoor allergen exposure range

Holt, Nat Immunol 2005
Why is allergy increasing?

Genes

Environment

Lifestyle

- Air pollution
- Allergen exposure
- Hygiene hypothesis
- Indoor climate
  - and more

- Diet (e.g. antioxidants)
- Vitamin D
- Obesity and overweight
- Physical inactivity
- Alcohol

Alcohol consumption and allergy

![Graph showing prevalence of allergy vs. number of drinks per week.](Linneberg, Clin Exp Allergy 2006)
Summary

- Type 1 allergy (atopy) is characterised by a an IgE mediated immune response.
- Atopic diseases include asthma, hay fever, atopic dermatitis etc.
- The prevalence of allergies have increased during the last decades.
- The increase is related to affluence, westernisation and urbanisation.
- Environmental factors resulting in low allergen exposure may be responsible (the hygiene hypothesis).
- Lifestyle factors may also play a role (obesity, alcohol etc.)

Tak for opmærksomheden!