

# Skin allergy to chemicals

- clinical, epidemiological and public health perspectives

*Jeanne Duus Johansen  
National Allergy Research Centre  
Department of Dermato-allergology  
Copenhagen University Hospital Gentofte  
Denmark*



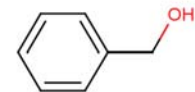
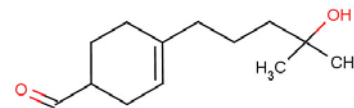
# Exposure

Wide spread skin exposure to chemicals

- Intended (e.g. cosmetics)
- Unintended (e.g. work place)

Many chemicals are allergens

- Preservatives
- Glues
- Dyes
- Fragrances
- Metals



# Epidemiology of skin (contact) allergy

21.6% of the European population is sensitized to one or more chemicals

Women: Men 2:1

Debut at young age:

- 12-16 years: prevalence 15%

Allergic eczema in 5-10% /year

A frequent work related disease



# Allergic eczema



Fragrances/preservatives



Hair dyes



Occupational exposures



shoes



# Environment/genes ?

Twin studies:

- A mainly environmental disease
- No specific genes identified

## Susceptible groups?

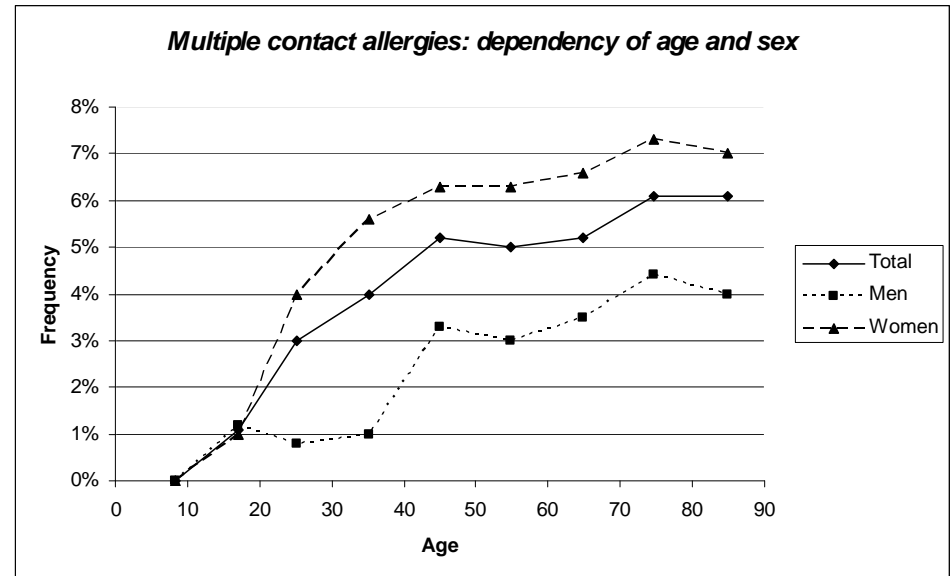
Multiple allergies

Weak allergens

Enzyme systems in the skin

Skin barrier defects

*Cumulative environmental exposure needed*



*Carlsen B et al. Contact Dermatitis 2007*



# Preventable

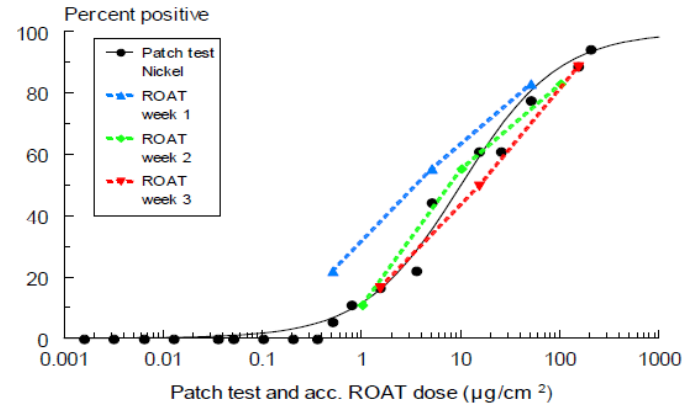
Dose-response

Thresholds in induction and elicitation

Used in nickel regulation:

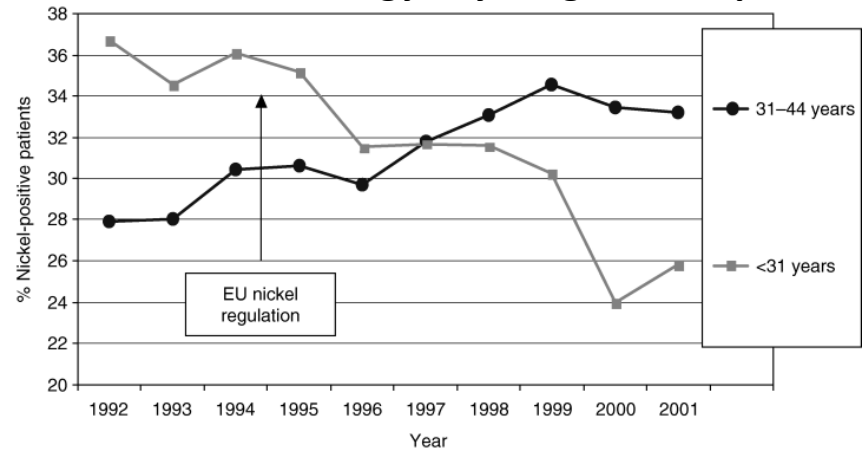
Consumer items in close contact with skin

Nickel release limit  $<0.5 \mu\text{g}/\text{cm}^2/\text{week}$



Fischer LA et al. Contact Dermatitis 2009

## Decrease in nickel allergy in young eczema patients

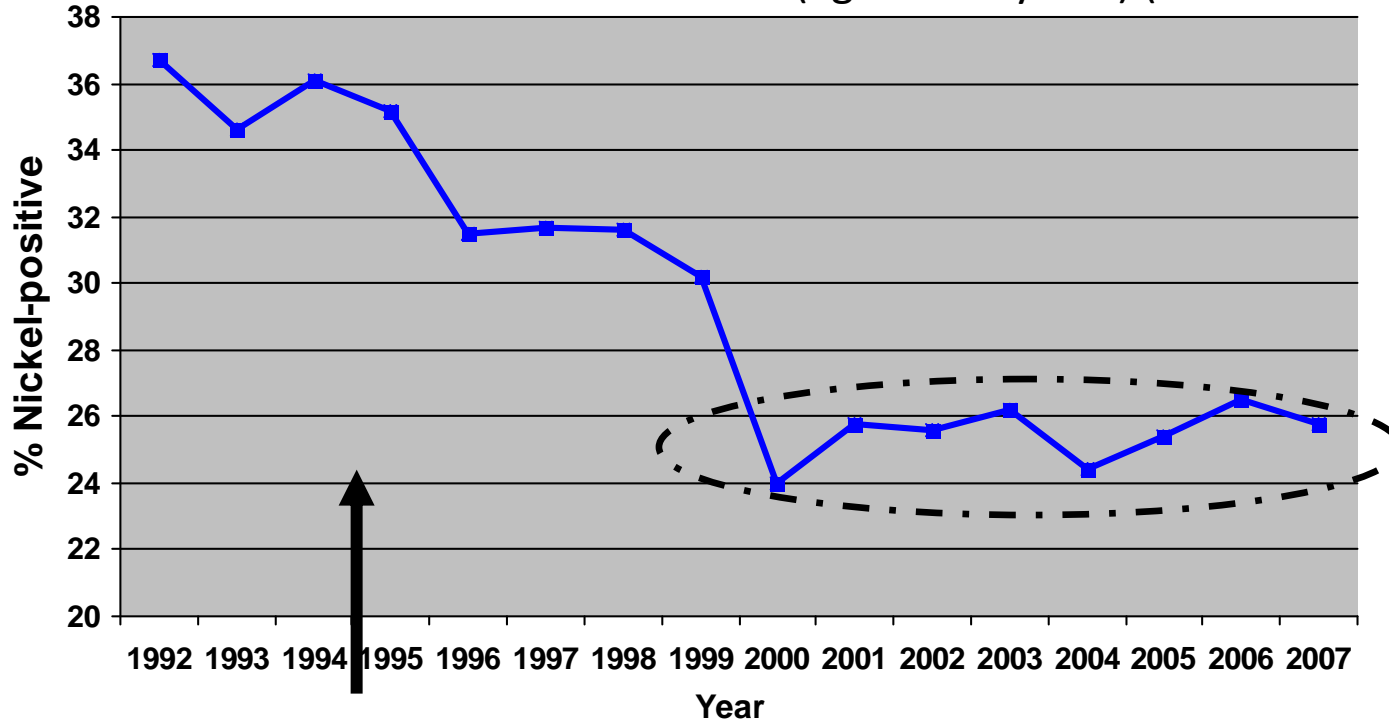


Schnuch, A. et al. Contact Dermatitis 2003



# Further trends...

Trend of sensitization to nickel in women (aged 1-30 years) (1992 - 2007)



EU-Directive



# Cosmetics

## Fragrance ingredients

- 1-4% of the population
- 10% of patients

## Causative products

- creams
- deodorants
- perfumes

Too high levels of skin allergens  
in products

Cocktails of allergens

*Uter W, Geier J, Schnuch A, Frosch PJ.*

*J Eur Acad Dermatol Venereol. 2007 Mar;21(3):374-9.  
Nardelli A, Carbonez A, Ottoy W, Drieghe J, Goossens A.  
Contact Dermatitis. 2008 Mar;58(3):134-41*





# Fragrance allergy and daily living

## Self-perceived effect on daily living ?

<b>N=147 with fragrance allergy (Gentofte Hospital, 18 months)</b>	
<b>Due to fragrance contact allergy</b>	
I have to take special precautions	<b>67.5%</b>
I often have eczema, itch	<b>47.0%</b>
I have had sick-leave	<b>17.1%</b>
My daily living is significantly affected	<b>45.3%</b>



## The prevalence and morbidity of sensitization to fragrance mix I in the general population

J.P. Thyssen, A. Linneberg,\* T. Menné,† N.H. Nielsen‡ and J.D. Johansen

General population

N=3460

Year 2006

Patch test (FM I)

Questionnaire

**Positive patch test to a mixture of 8 fragrance ingredients were positively associated with:**

**I. Dermatitis to cosmetic products (past 12 months):**

OR: 3.5 (CI 2.0 -6.2)

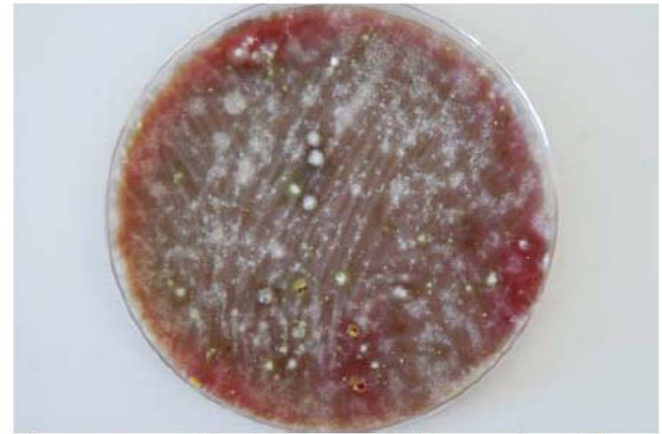
**II. Dermatitis to cosmetics lead to medical consultations**

Or: 3.4 ( CI1.8 -6.2)



# Preservation

Needed to avoid contamination of water-based products cosmetics and occupational products

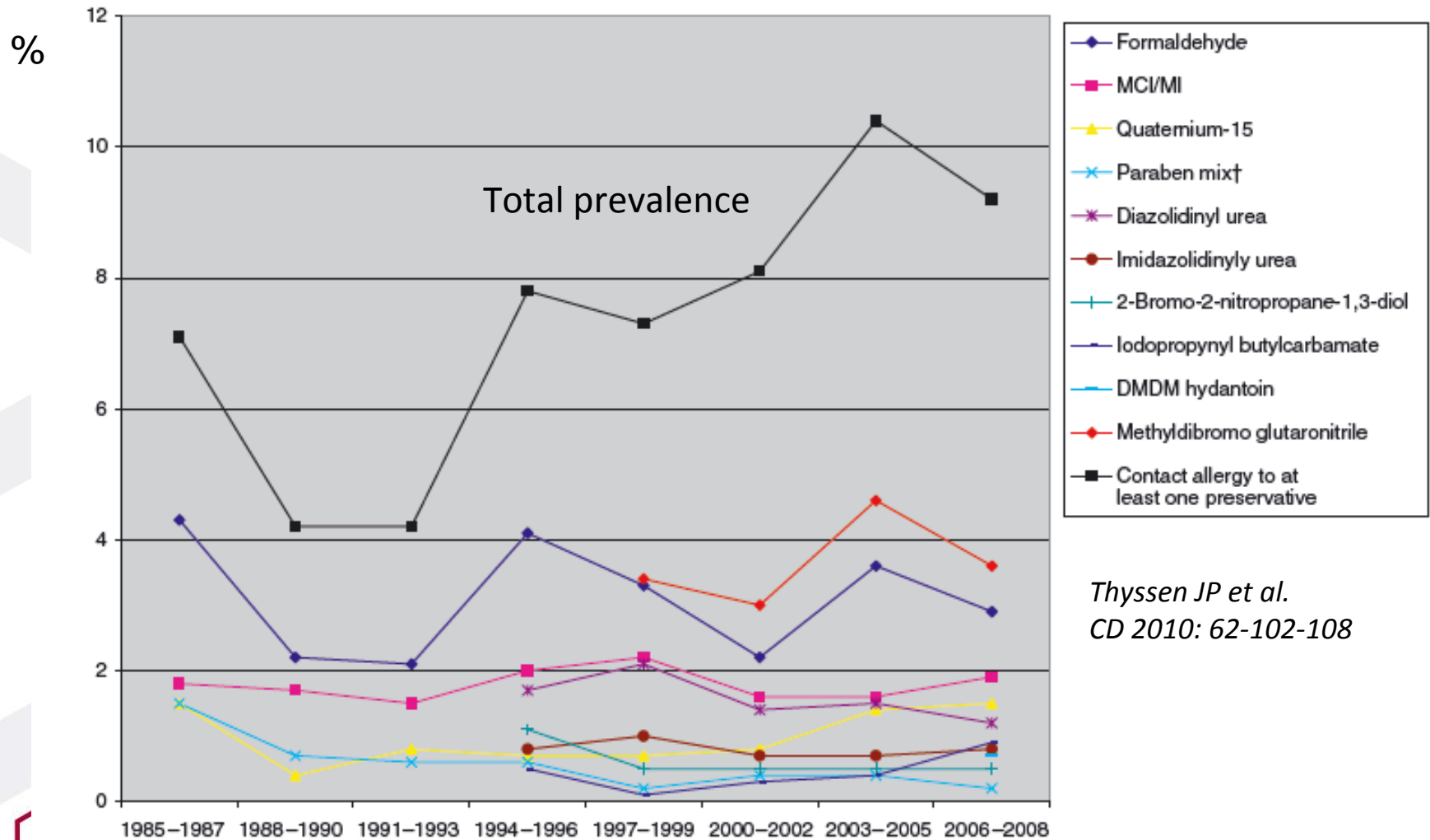


*Lundov M. Ph.d.-thesis 2011*



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# Skin allergy to preservatives

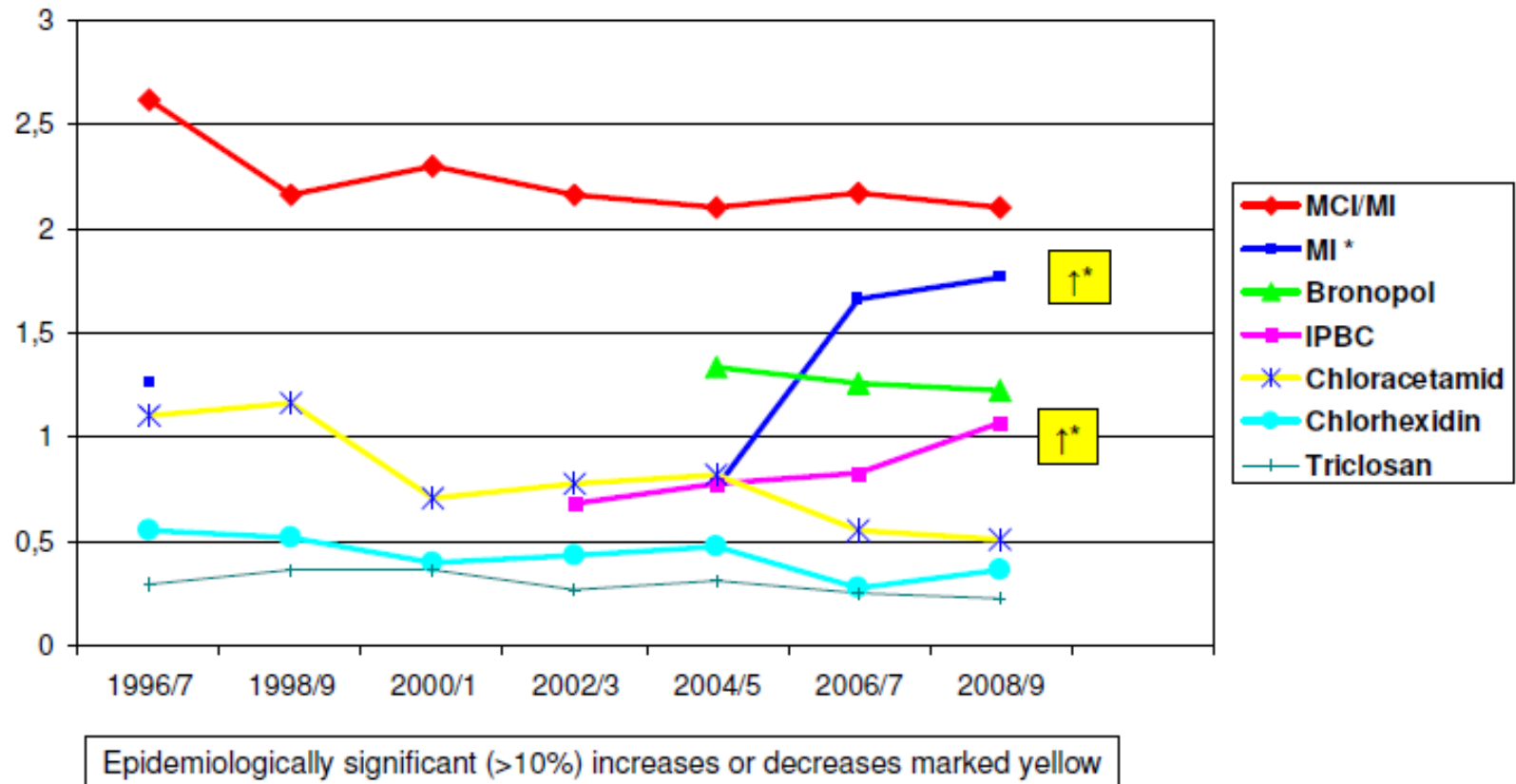


Thyssen JP et al.  
CD 2010: 62-102-108

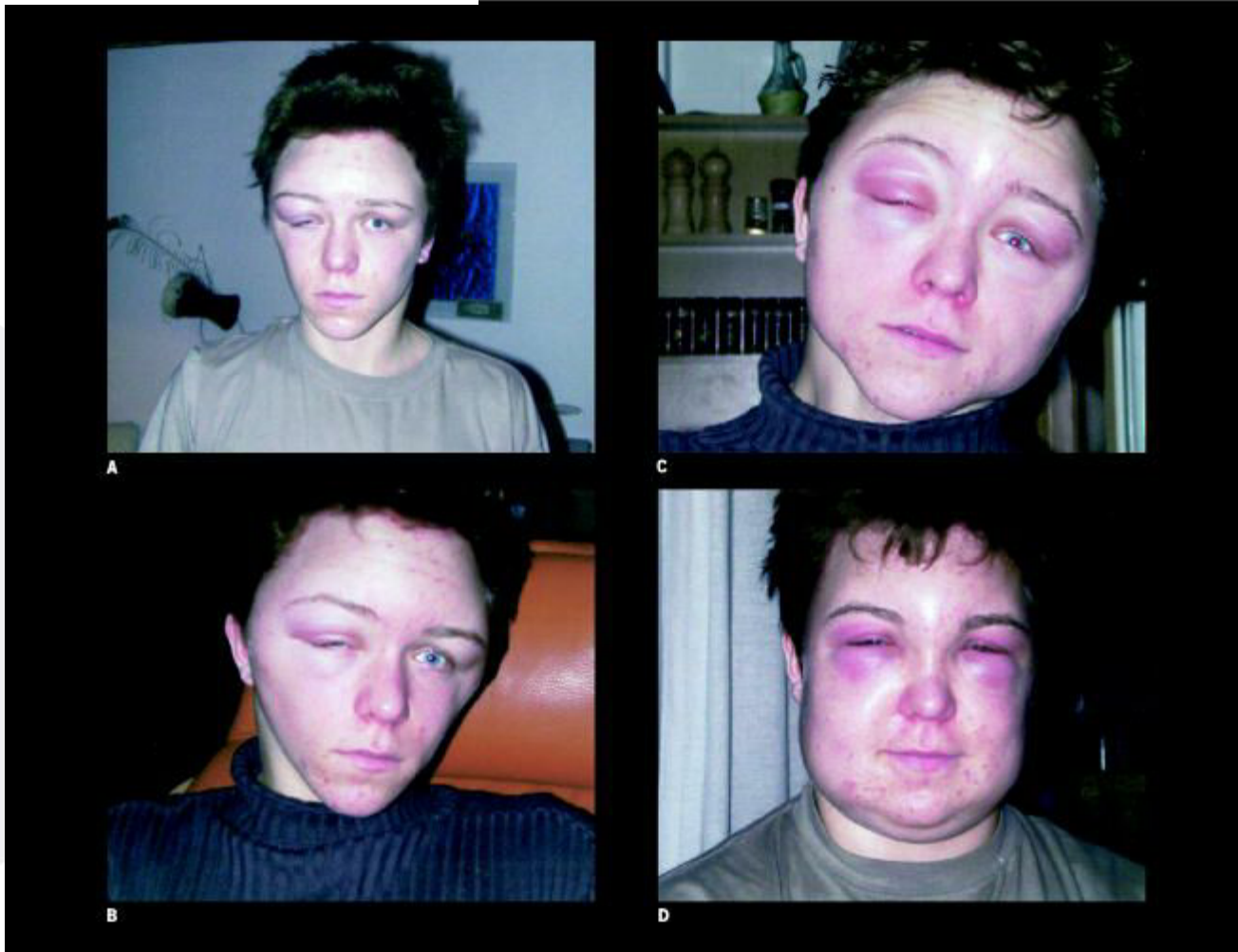
Fig. 1. Temporal trends of preservative allergy in Denmark (1985-2008).

# Skin allergy to preservatives

## - German data



# Hair dye allergy



NATI

Gudbjerg P. Ugeskr. For Læger 2003;11:165(33)

# Hair dyes

- Contact allergy caused by hair dyes is an important health problem often causing acute and severe dermatitis
- Many hair dye substances are extreme or strong sensitizers.
- These may not be safe for the consumer



Scientific Committee on Consumer Products

SCCP

MEMORANDUM ON

HAIR DYE SUBSTANCES AND THEIR SKIN SENSITISING PROPERTIES

Adopted by the SCCP during the 10<sup>th</sup> plenary of 19 December 2006



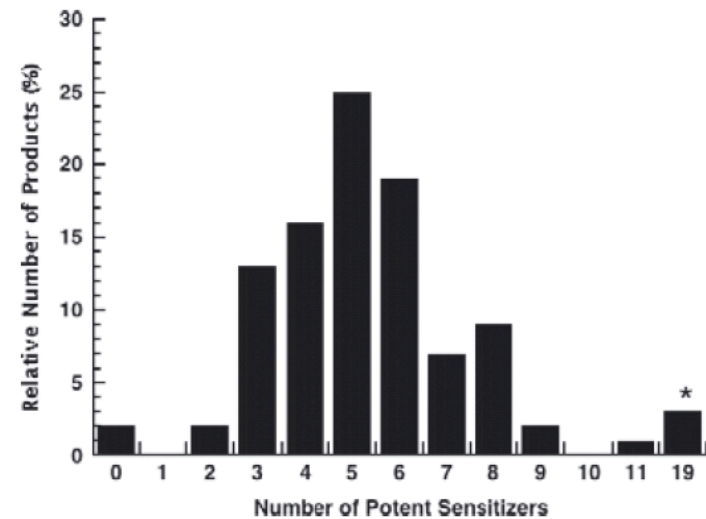
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## Potent skin sensitizers in oxidative hair dye products on the Swedish market

KEREM YAZAR, ANDERS BOMAN AND CAROLA LIDÉN  
Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden

### Ingredient label examined:

- 120 out of 122 oxidative hair dye products contained potent skin sensitizers
- More than 80% contained at least four such substances





# Exposure to hair dyes

75% of adult women have dyed their hair

*Sosted H.Br. J. Dermatol. 2005: 153, 132-135*

## Girls (15-18 years)

n=1062 population-based:

- 82.3% have dyed their hair
- 13.1 years age at first hair dye
- 3.7 hair dyes/ year
- Adverse effects:
  - 2.9% oedema after hair dying
  - 9.4% report rash from hair dyes

*Extract from:*

*Bregnhøj A, 2011: Contact Dermatitis:64:85-9*



# Occupational exposure: hairdressers

## Exposure to hair dye in saloons from

- Dying
- Cutting
- Background
- Wrong use of gloves

*Lind ML et al Ann Occup Hyg. 2005 Aug;49(6):473-80*

## Cohorte of 5.324 hairdressers:

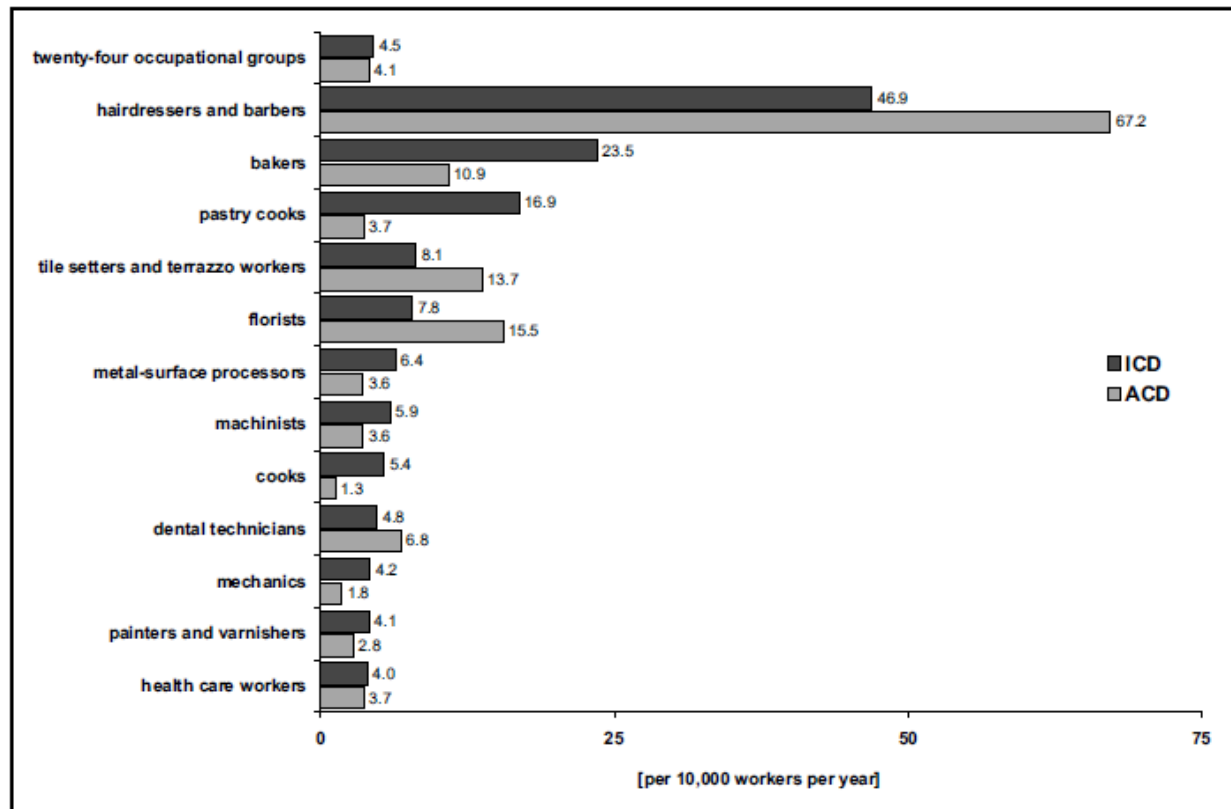
- 44.3% stopped in profession
- Mean time in profession: 8.4 years
- Half of these because of hand eczema
- 70% says it started as apprentice

*Lysdal S et al. Contact Dermatitis 2011: submitted*



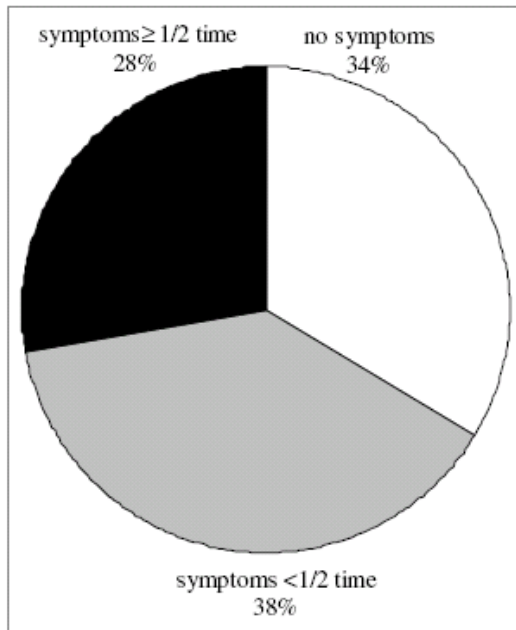
# Occupational skin disease:

- Represent up to 25 % of all occupational illness
- Account for 90% of all work related problems in the age group of 15-25 years



# Consequences

## Hand eczema



15-year follow-up:  
2 out of 3 have had symptoms

## Chronic disease

**Skin allergy (positive patch test):  
Risk factor for bad prognosis**

**The determinants of chronic disease  
not known**



# Consequences

## Sick-leave: 7%

- Total median: 38 weeks

## Medical attention

### Treatment

- 50% corticosteroids

## Psycho-social consequences

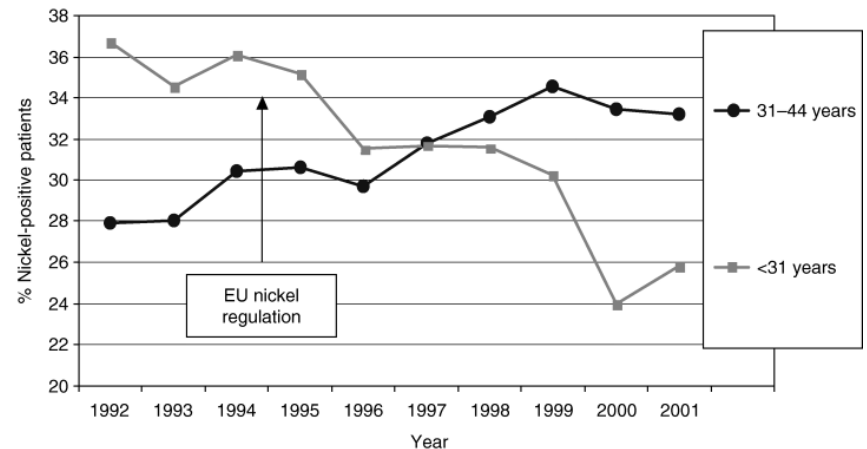
- Disturbances: 96%

## Occupational changes

**Estimated direct expenses of occupational disease > 5 billion Euro/years**

*Meding B et al. Contact Dermatitis 2005;53:308-313*  
*Br J Derm 2005;152:975-980; J. Invest Dermatol 2005:893-7*  
*John SM. Epos 2010*

## Decrease in nickel allergy in young eczema patients



*Schnuch, A. et al. Contact Dermatitis 2003*

Reduction in new cases estimated value  
in DK: 1.3 billion Euro/20 years

# Conclusions

## Skin allergy is frequent

- Caused by a range of different exposures
- Frequent problems / severe problems

Impact on the individual and society

Can be reduced/prevented



# Gaps of knowledge

## Data on a European level

- Trends
- Causative exposures (consumers/occupational)

## Susceptible groups ?

- Role of skin enzymes
- Role of skin barrier
- Genetics/gender

## Determinants of chronic disease

## Strategy for using preservative

**Exposure data:** cocktails of allergens, many sources

**Risk assessment strategy and risk reduction : preventive measures**



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