



# La main au travail

18 et 19 novembre 2004

Journées suisses des Médecines du personnel des institutions de soins

Journées scientifiques de la Société Suisse de Médecine du Travail

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# Latex Allergy – 2004 update

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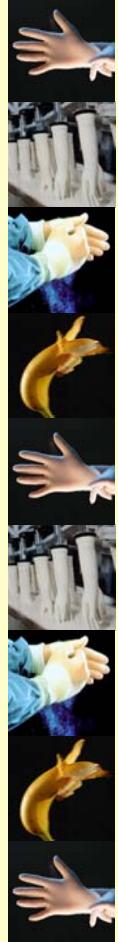


Centre Hospitalier Universitaire Vaudois,  
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# Content :

1. Primary and Secondary preventions  
or Is the epidemiological peak behind ?
2. The Protein Contact Dermatitis  
or Beyond hypersensitivity types
3. The Latex – Fruit Syndrome  
or From hand to mouth



# History

- latex use documented as early as 1600 BC  
(ball in Mesoamerica)
- latex gloves mentionned about 1830
- in surgery, routinely used since 1<sup>st</sup> WWar
- 1927: 1<sup>st</sup> description of immediate type I reaction to latex (urticaria and laryngal edema in dentistry)
- 1933: multiple type IV reactions
- 1987 CDC recommendations for prevention of viruses transmission ⇒ 25x increase in latex containing gloves use
- since 1989 explosion of cases



# Increased Exposure

increased stress to trees  
with increased formation of  
pathogenicity-related  
proteins

modification of manutention  
- shorter time in ammonia  
(delocalisation)  
- increased protein residues



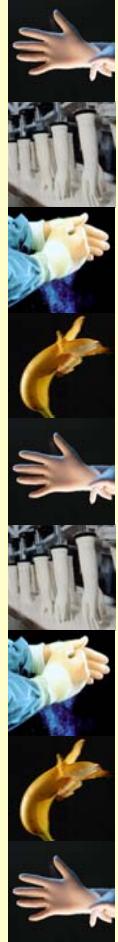
in the context of increasing risk factors:

- atopy
- multiple surgery
- hand skin lesion
- «exotic» fruit allergy



# Latex epidemiology: problem of definition

- type of reaction ( $I$  *versus*  $IV$  and irritation)  
allergist *versus* dermatologist
  - sensitization *versus* clinical manifestation  
IgE survey *versus* clinical history or provocation
  - disease *versus* disability  
seek for medical attention *versus* claims
- from up to 1 / 5 sensitized Health Care Workers  
to 1 / 10'000 claims !



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# NIOSH alert june 1997

<http://www.cdc.gov/niosh/latexalt.html>



- recommendations to employers and workers
    - to reduce new sensitization by reducing exposure to latex protein
    - to treat latex allergic workers
1. use *nonlatex* gloves for activities not likely to involve contact with infectious materials (food preparation, routine housekeeping, maintenance, etc.)
  2. appropriate barrier protection is necessary when handling infectious materials [CDC 1987]. If you choose latex gloves, use *powder-free* gloves with *reduced protein content*.
  3. avoid contact with latex *gloves* and other latex-containing *products* and *areas* where you might inhale the *powder* from latex gloves worn by other workers.



# « Impact measurement »

- Allmers 1998 JACI 9819303 211/10/7, followed 6 months:  
powder-free in some care units, non latex gloves to sensitized HCW  
➡ IgE level; no new sensitization; stop of asthma ttt (in 2 / 2)
- Hamilton 2000 JACI 10756239 168/20/4+8, followed 10-15 months :  
personal avoidance for anesth., but still powdered for surgeon  
all asymptomatic after intervention; ➡ IgE level after 15 months (but not all after 10)
- Turjanmaa 2002 JACI 12170246 160 allergics (71 HCW), followed 3y  
HCW: glove choice: low allergenicity, good barrier, affordable price  
for the all hospital (no personnal avoidance, still powdered)  
no anaphylactic reaction; no work change in HCW (but 2 in rubber band plant); ➡ hand eczema in HCW 54% ➔ 38%



## « Impact measurement » (2)

- Vandenplas 2002 JACI 11799378      36 allergics, followed 56 months  
no standardized interventions: 16 cessation, 20 reduction of latex exposure;  
non specific bronchial hyperresponsiveness (NSBH) test at follow-up  
same clinical and NSBH outcomes; but impact on working status if cessation
- Bernstein 2003 AnnAllAsthmalmmu 12602668      67 HCW, 1 point  
retrospective questionnaire, interventions & outcomes  
latex free for the allergics allows remission of urticaria and asthma,  
rhinitis is more difficult to control (co-worker with powdered gloves)
- Nettis 2004 Allergy 15180758      17 HCW, followed 4,5 years  
personal avoidance, low-prot, non-powdered for co-workers  
➔ skin sensitivity and IgE level; ➔ symptoms; provocation test still positive, but after longer exposition

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# **Decreasing incidence of occupational contact urticaria caused by natural rubber latex allergy in German health care workers**

**Henning Allmers, Dr med, MPH,<sup>a</sup> Jörg Schmengler, MD,<sup>b</sup> and Swen Malte John, Dr med<sup>a</sup>**

*Osnabrueck and Delmenhorst, Germany*

J ALLERGY CLIN IMMUNOL AUGUST 2004; 114 (2): 347-51 PMID 1536514

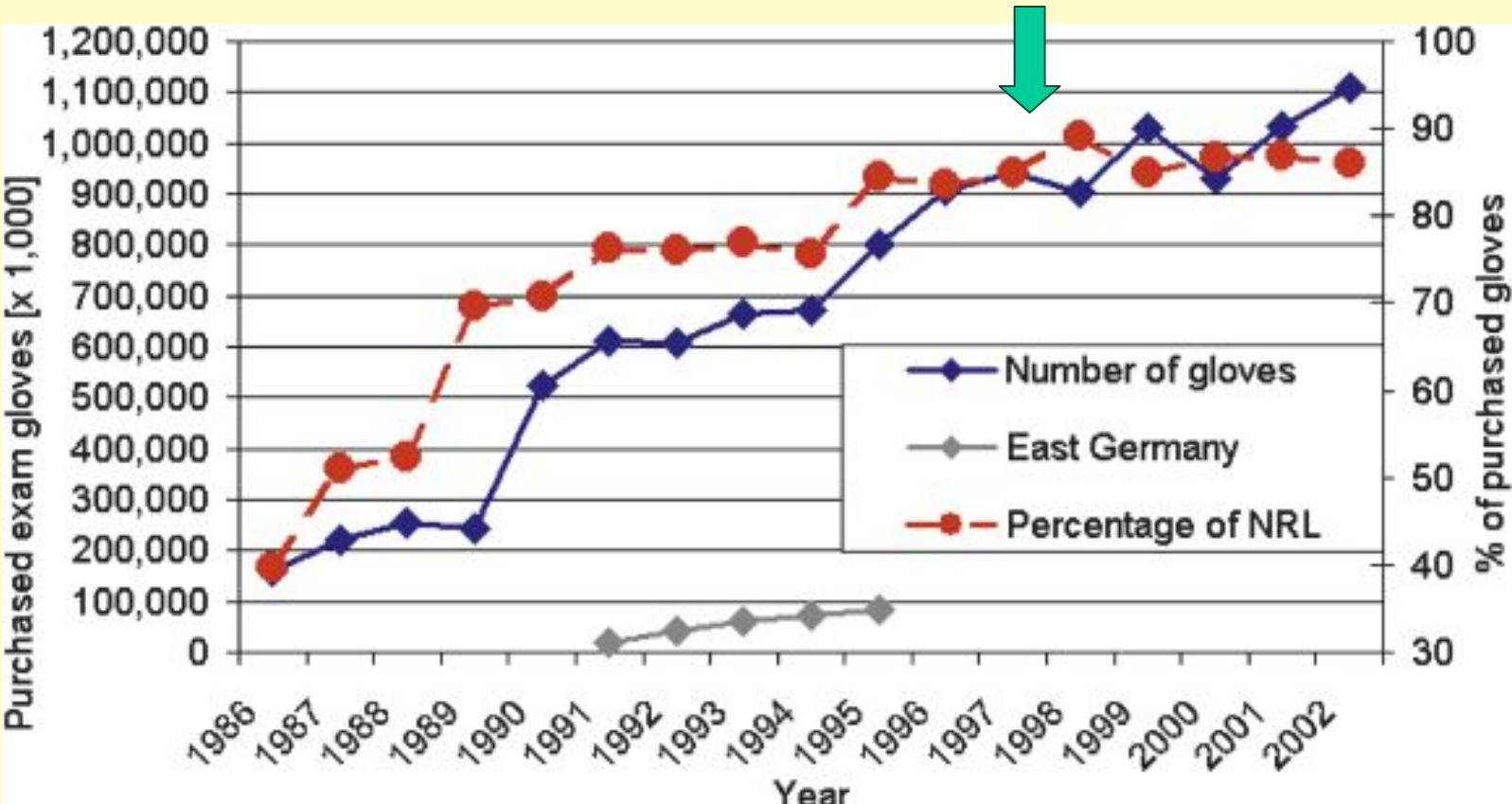
**technical regulations for dangerous substances  
in Germany, dec. 97:**

- only low-allergen, powder-free latex gloves
- powdered latex gloves not permissible

**evaluation of :**

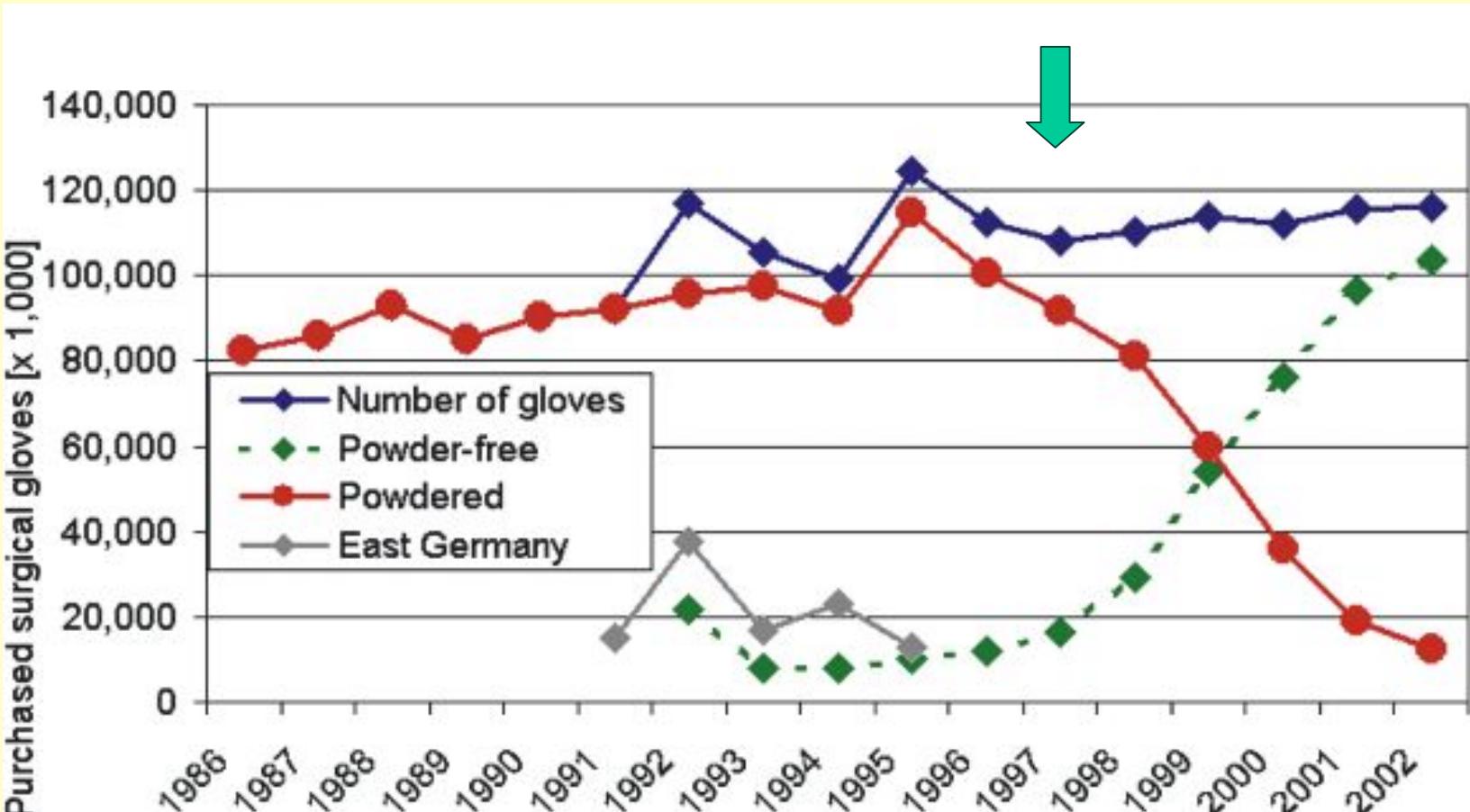
- glove use data (1986 - 2002) GPIS
- latex allergy (1996 - 2002) BGW

# glove use data



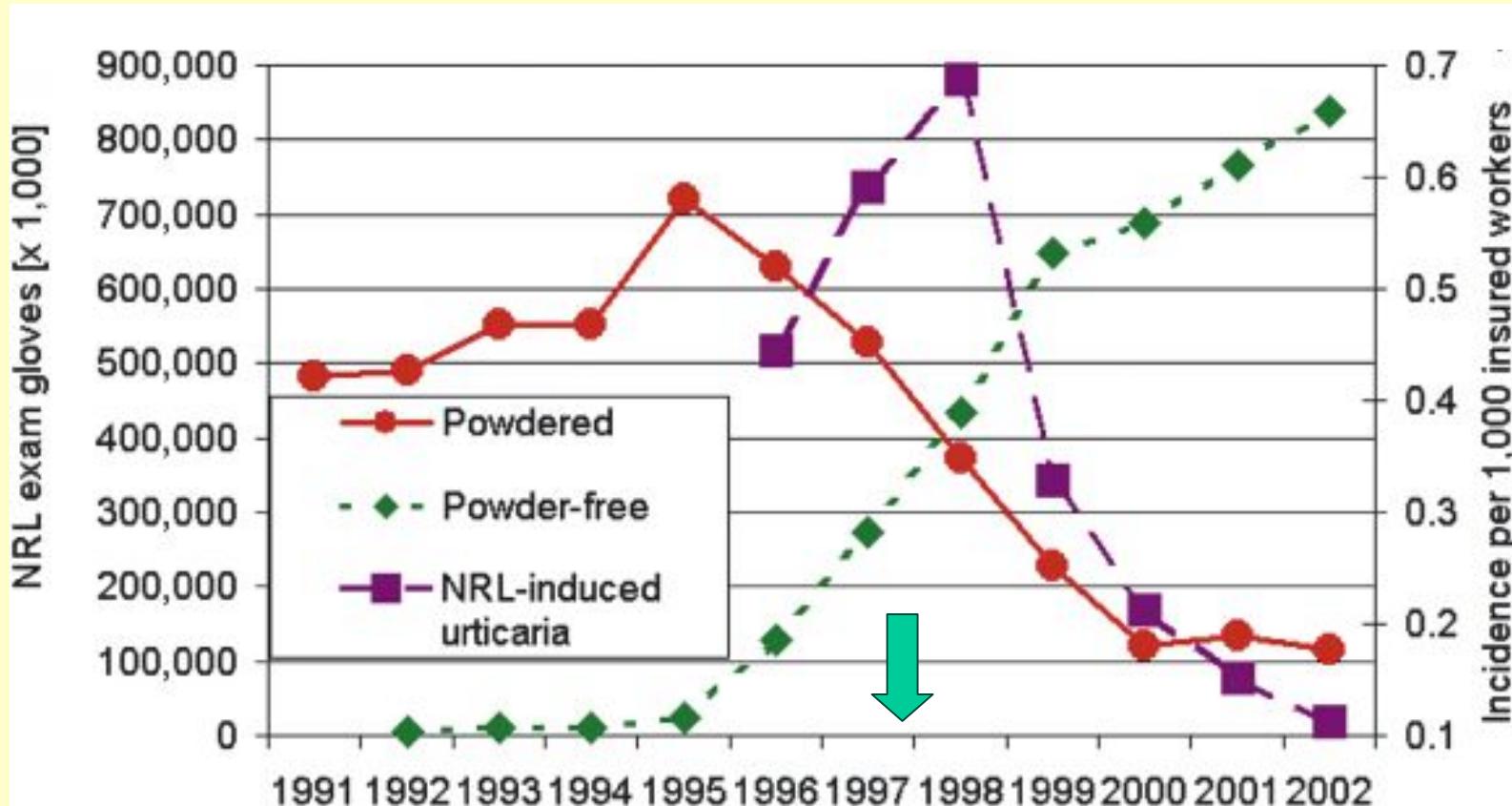
Purchase of nonsterile examination gloves and %-age of NR latex gloves

# glove use data



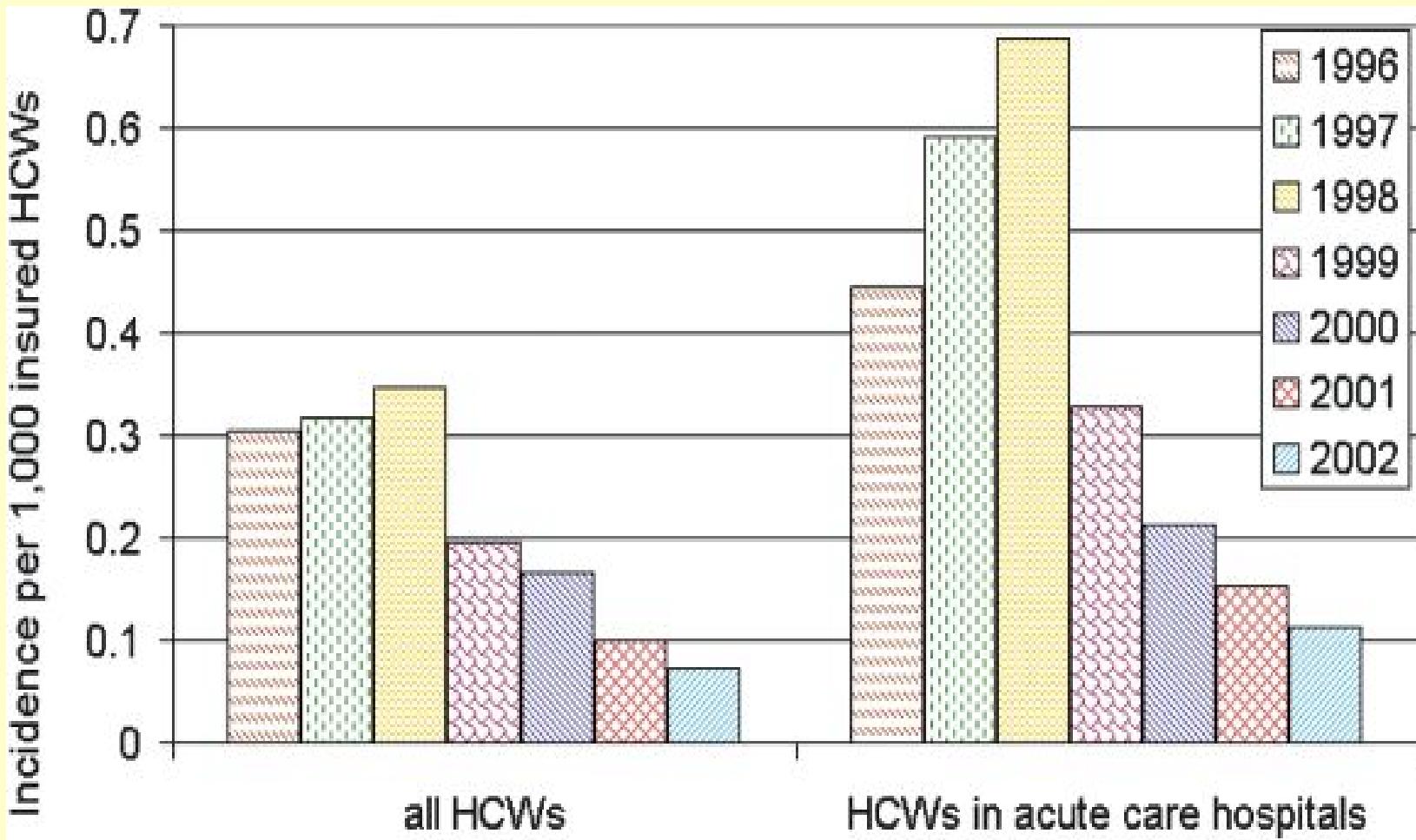
Number of sterile surgical latex gloves,  
split into powdered and powder-free

# incidence of suspected cases of latex allergy



purchase of latex nonsterile examination gloves  
split into **powdered** and **powder-free**  
and incidence of suspected cases of **latex contact urticaria**

# incidence of suspected cases of latex allergy



Incidence of suspected latex-induced contact urticaria



# but don't forget ! ! !

- in case of **anaphylaxis**, complete latex free environnement is absolutly necessary
- other workers than HC are at risk:  
food handlers, construction, agriculture,  
hairdressers, cleaners

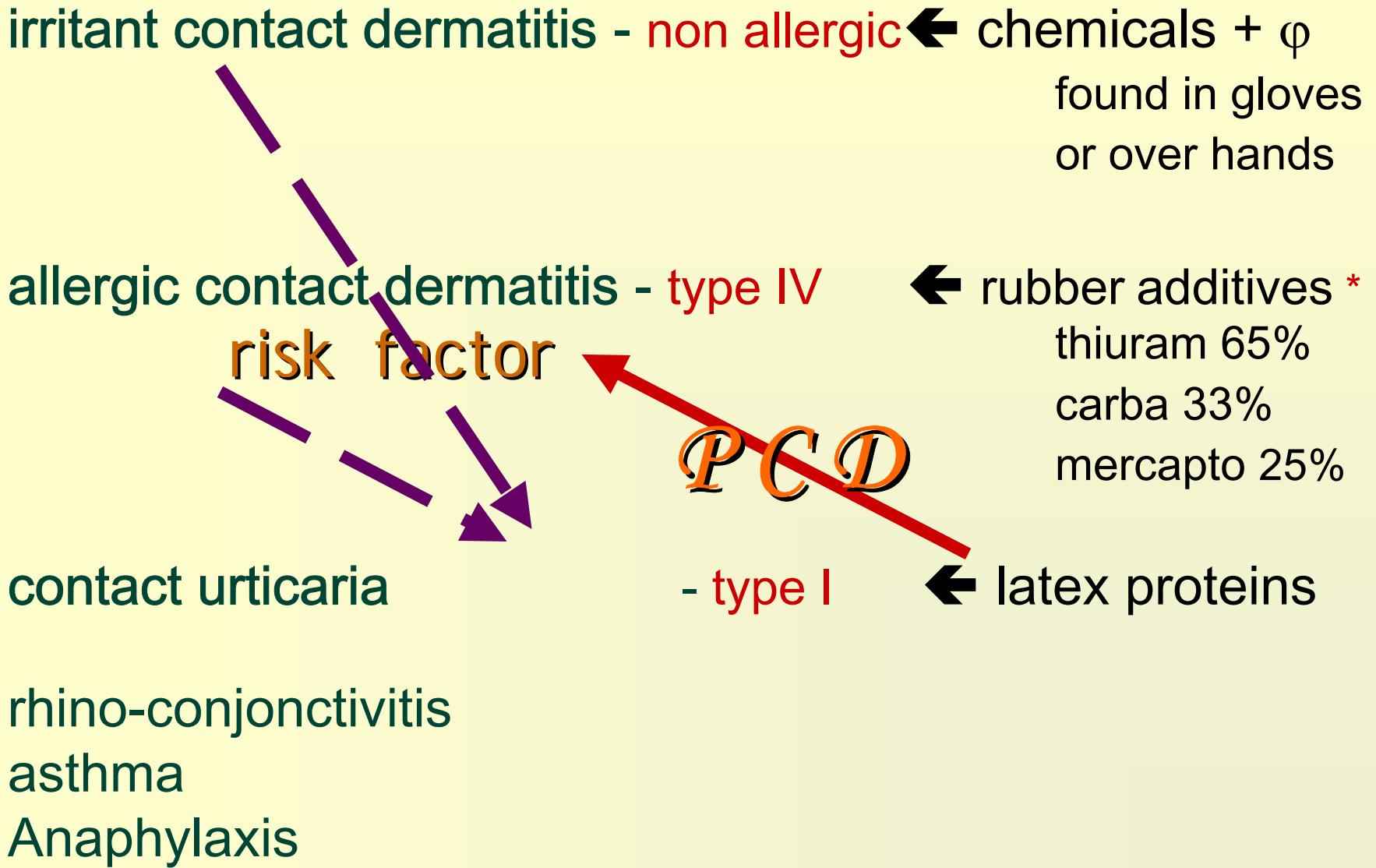
Valks 2004 Contact Dermatitis 15186377

Chen 2004 Dermatology 15178914

- other risk group : spina bifida



# Types of hypersensitivity



\*15178914 & 12641577



# *Protein Contact Dermatitis* or

Skin as a route of exposure to protein allergens

Smith Pease C. ExpDermatol 2002 12139675

- proteins of > 500 Da usually do not penetrate the stratum corneum of normal skin
- many circumstances can reduced stratum

**Table 2** Causes of reduced stratum corneum barrier integrity in normal skin.

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Pre-existing dermatitis	e.g. irritant, allergic
Physical damage	e.g. burned, shaved, wounded
Chemical damage	e.g. detergents and other penetration enhancers
Increased hydration	e.g. excessive hand washing
Occluded skin	e.g. wearing of gloves

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# *Protein Contact Dermatitis* or

Skin as a route of exposure to protein allergens

Smith Pease C. ExpDermatol 2002 12139675

- proteins of > 500 Da usually do not penetrate the stratum corneum of normal skin
- many circumstances can reduce stratum corneum barrier in normal skin
- protein contact dermatitis
  - introduced in 1976, in Danish food handlers
  - prot. can cause type I or IV or mixt reaction
  - described for many proteins

**Table 1** Examples of proteinaceous substances that can cause dermatitis and urticaria following human skin contact.

Substance	Molecular mass
Foods	
Egg (albumin)	≈ 45 kDa
Raw fish	—
Milk (casein)	≈ 25 kDa
Cheese	—
Peanut (lectin)	≈ 29 kDa
Meat	—
Wheat/flour ( $\alpha$ -amylase)	≈ 45 kDa
Plant proteins	
Birch pollen allergen	18 kDa
Ragweed pollen	—
Natural rubber latex proteins	
Heveins	
Hev b1 (insoluble)	14.6 kDa
Hev b2 (soluble)	34–41.3 kDa
Hev b3 (insoluble)	23–27 kDa
Hev b4 (soluble)	50–75 kDa
Hev b5 (soluble)	16 kDa
Hev b6.01 (soluble)	20 kDa
Hev b6.02 (soluble)	4.7 kDa
Hev b7 (soluble)	46 kDa
Hev b8 (soluble)	14 kDa
Hev b9 (soluble)	51 kDa
Other classes/enzymes	
Cellulases	
Glucoamylases	
Papains	
Subtilisins	
Xylanases	



# Clinical evidences

- since 1992: case reports of isolated contact dermatitis to latex  
(patch tests with rubber additives, skin prick tests and RAST to natural latex: negative; but positive patch test)
- 1996: 16+/822 (1.9%)
- 2001: 4+/167 (2.4%); 4 IgE-; 1 immediate SPT+, but all 4 with late reactions
- 2002: British multicentre study: 27+/2'738 in routinely patch tested patients (1%)

Sommer S. British Journal of Dermatology 2002 11841376



# Epicutaneous Natural Rubber Latex Sensitization Induces T Helper 2-Type Dermatitis and Strong Prohevein-Specific IgE Response

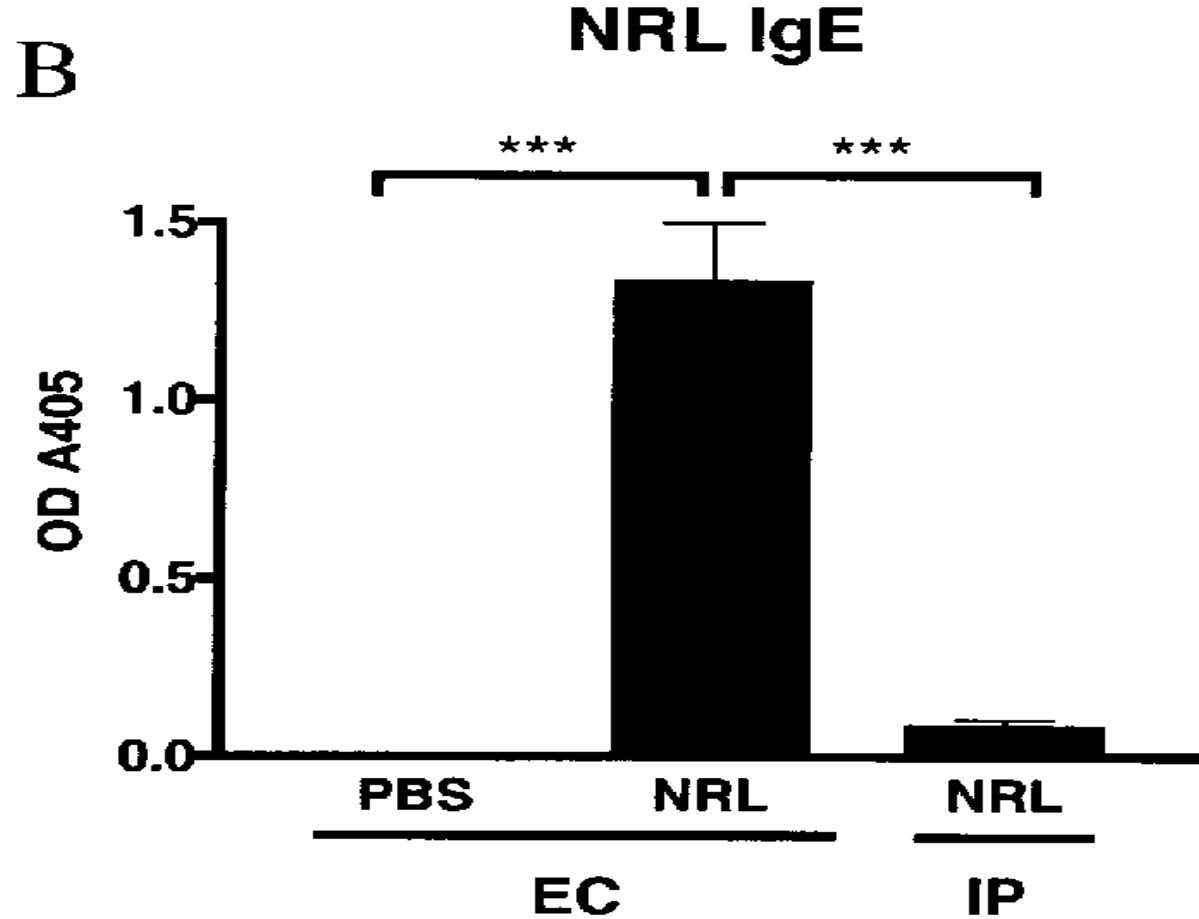
Maili Lehto,\* Minna Koivuluhta,\* Guoying Wang,\* Iman Amghaiab,\* Marja-Leena Majuri,\* Kai Savolainen,\* Kristiina Turjanmaa,† Henrik Wolff,\*‡ Timo Reunala,† Antti Lauerma,§ Timo Palosuo,¶ and Harri Alenius\*

J Invest Dermatol 2003 ; 120 (4) : 633 - 40 12648228

- murine model of latex sensitisation (*vs* PBS):
  - epicutaneous : latex patch 3x 1 week
  - *vs* intra-peritoneal : ip D0-7, sacrifice D19
- biopsy: dermatitis
  - with epidermal and dermal thickening
    - inflammatory infiltration  
(eosinophils, degranulated mast cells, CD4+ cells)
    - cytokines and chemokines of  $T_H2$  and  $T_H1$  type

# IgE

- epicutaneous application induces high IgE levels



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# Latex - Fruit Syndrome

- 1991: first description of latex - banana associated allergy
- still growing number of cases and number of fruits involved
- 21 - 58% of latex allergic have related food allergy
- at the opposite, risk to be latex allergic if food allergy : 24x
- cross reacting epitope better known

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## Aliment

## Type de protéine-correspondance au latex

Banane, avocat, châtaigne, kiwi, papaye, mangue, fruit de la passion, tomate

Poivre de Cayenne

Céleri, banane, ananas

Pomme de terre

Figue, pêche, melon

Noix de coco, pastèque, néflier, cerise, pomme, carotte, abricot, fraise, épinard, amande, lychee, origan, sauge,...

Chitinase - Hev b 6 et 11

$\beta$ -1,3-gluconase - Hev b 2

Profiline - Hev b 8

Profiline - Hev b 8

Patatine-like - Hev b 7



# Conclusions

1. In HCWs the epidemiological peak seems behind, but be carefull of other workers and anaphylaxis.
2. Mecanisms of sensitization are poorly understood, but new informations arise.
3. Latex - fruit syndrome must be a new area of attention.





# Thank you



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