

Rubber, new allergens and preventive measures

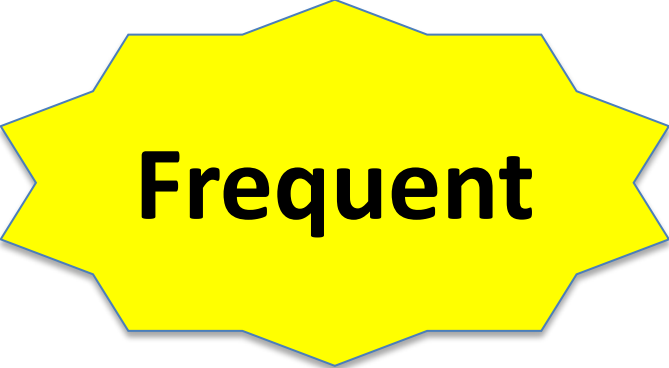
© Dr Crépy MN APHP

Marie-Noëlle CREPY
Paris University Hospital,
Centre Hôtel-Dieu



1) diagnosis :





Frequent

- Rubber : one of the main causes of occupational contact dermatitis,
- mostly rubber gloves, especially in health care workers, cleaners and construction workers.

Immediate :
Type I

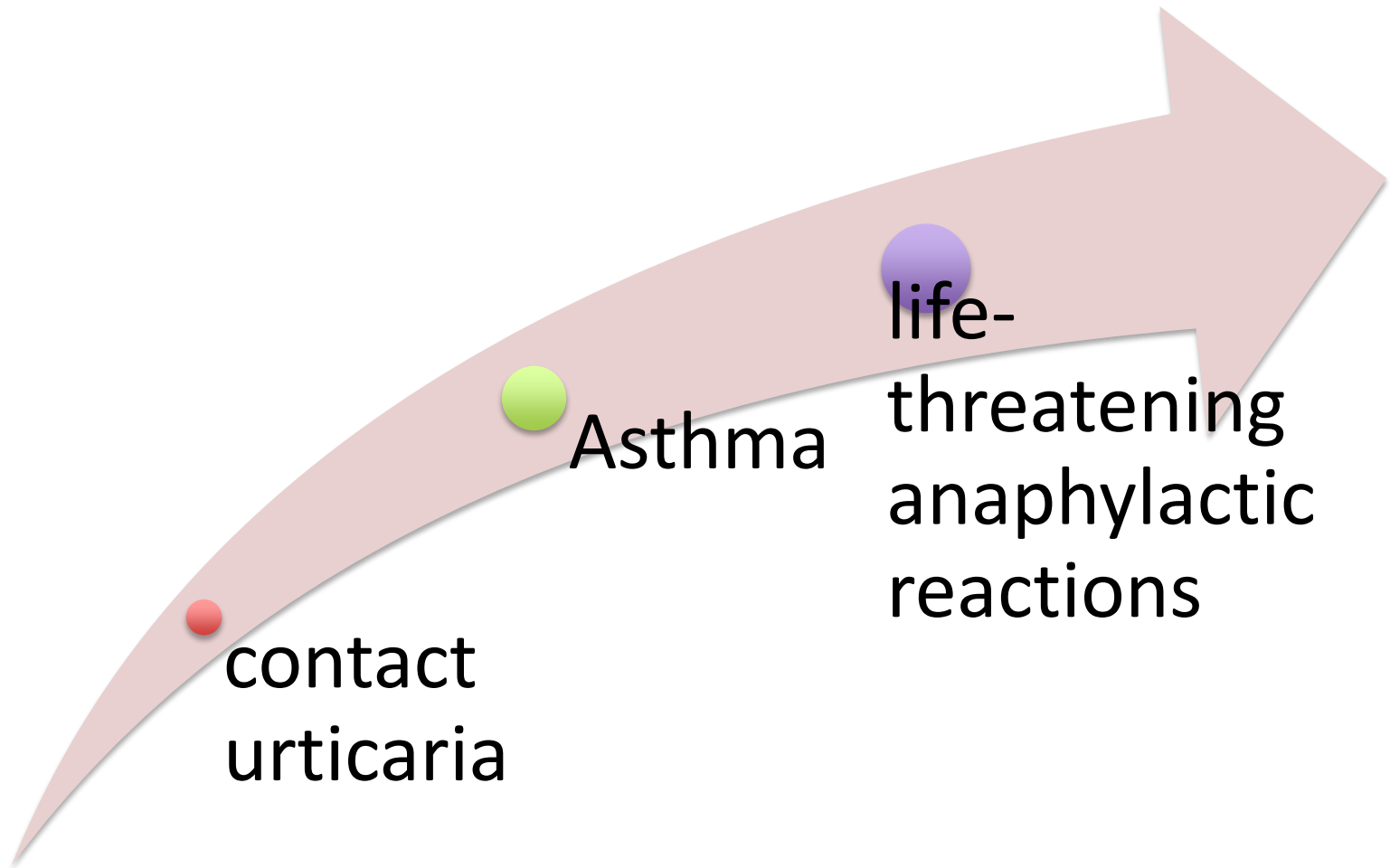
Delayed
Type IV

**RUBBER
ALLERGY**

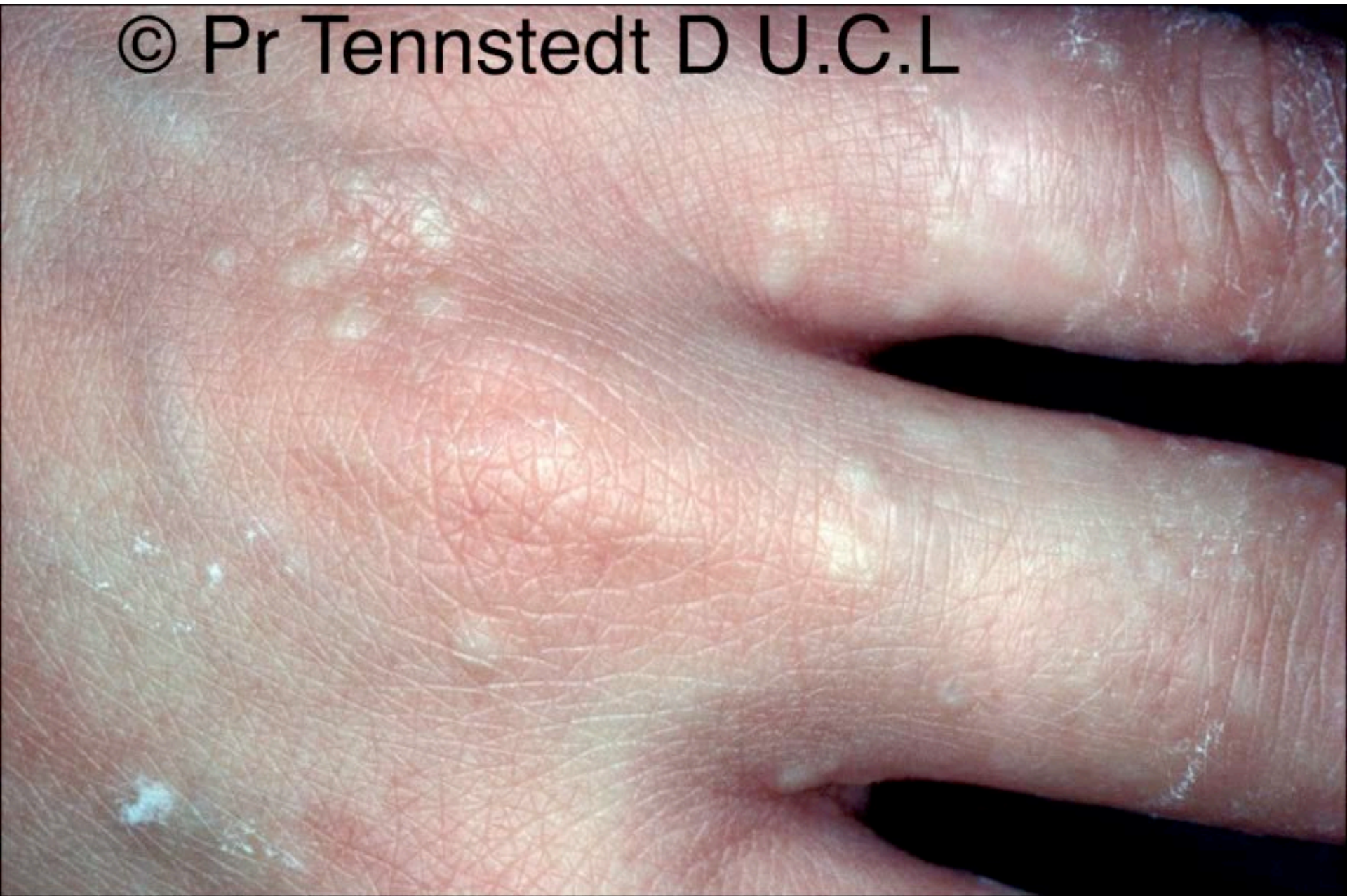
```
graph TD; A[Immediate : Type I] --> C((RUBBER ALLERGY)); B[Delayed Type IV] --> C;
```

The diagram illustrates the classification of Rubber Allergy. It features a central blue circle labeled 'RUBBER ALLERGY'. Two arrows point towards this central circle from above. The arrow on the left originates from a red rounded rectangle containing the text 'Immediate : Type I'. The arrow on the right originates from an orange rounded rectangle containing the text 'Delayed Type IV'.

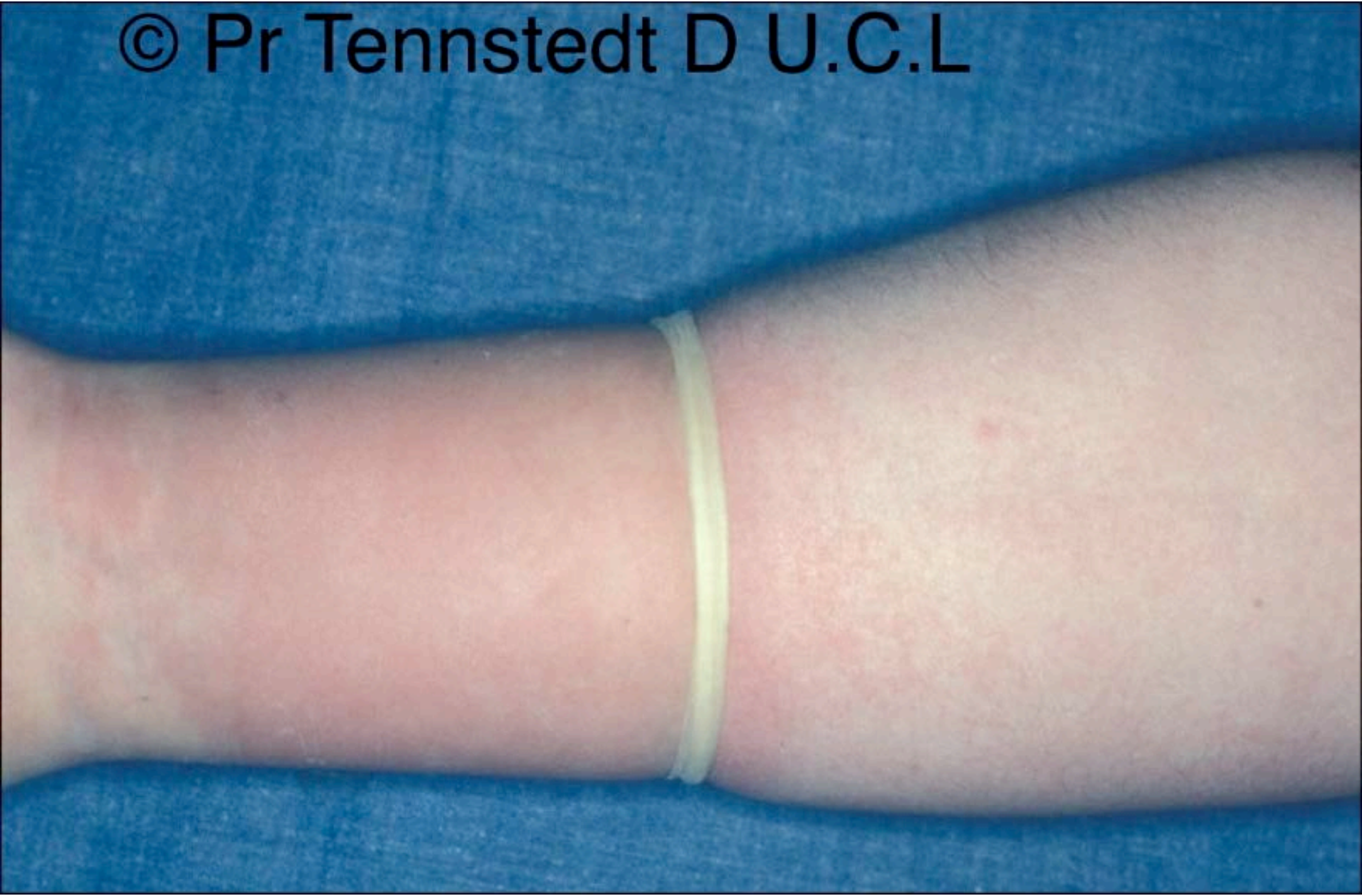
Natural Rubber latex allergy : immediate reactions



© Pr Tennstedt D U.C.L



© Pr Tennstedt D U.C.L



Diagnosis : prick tests (and IgE)



allergie au latex

Allergic contact dermatitis (ACD)

- Contact delayed reaction
- eczema



© Dr Crépy MN APHP

© Dr Crépy MN APHP



© Dr Crépy MN APHP



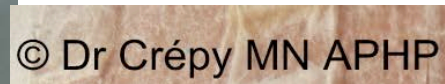
Patch testing

```
graph TD; A[Patch testing] --> B[European baseline series]; A --> C[Rubber additive series]; A --> D[Gloves];
```

European
baseline series

Rubber additive
series

Gloves



2) Allergens



Natural Rubber Latex

Biopolymer : cis-1,4-polyisoprene

Latex : white colloidal suspension (rubber + proteins...)

Natural rubber latex

- > 200 proteins
- 15 proteins internationally assigned as allergens : Hev b

★ Hev b 15



Entry date	April 27, 2014 12:22 +1GMT
Last update	April 27, 2014 12:24 +1GMT
Allergome Code	11621
Name	Hev b 15
Common Names	Serine protease inhibitor
Biological Function	Serine Protease Inhibitors
Isoforms, Variants, Epitopes	Hev b 15.0101
Links to Molecule Sequences	Hev b 15 - B3FNP9 - UNIPROT , Hev b 15 - Q6XNP7 - UNIPROT , Hev b 15.0101 - W0USW9 - UNIPROT
Sources	Euphorbiaceae, Hevea brasiliensis, Latex, Plants, Rubber Tree, Siphonia brasiliensis ... other Source Terms in available Languages ->
Links to Source Taxonomy	Hev b - 3981 - NCBI , Hev b - 3981 - UniProt , Hev b - 506431 - ITIS , Hev b - Discover Life , Hev b - Wikipedia
Links to Source Images	Hevea brasiliensis on Google images

Molecular allergens in the diagnosis of latex allergy (*specific IgE, ImmunoCAP*)

Major interest to confirm latex allergy diagnosis :
Hev b 1, 3, 5, 6.01 et 6.02

Markers of asymptomatic latex sensitivity: Hev b 8,
(profilin, pan-allergen. pollen-food allergy), carbohydrate
determinants (CCD)

Hev b 13 : major interest in occupational allergy.
Currently not available for in vitro diagnosis

CHEMICAL ADDITIVES

Rubber vulcanisation additives

Thiurams

dithiocarbamates

benzothiazoles

guanidines

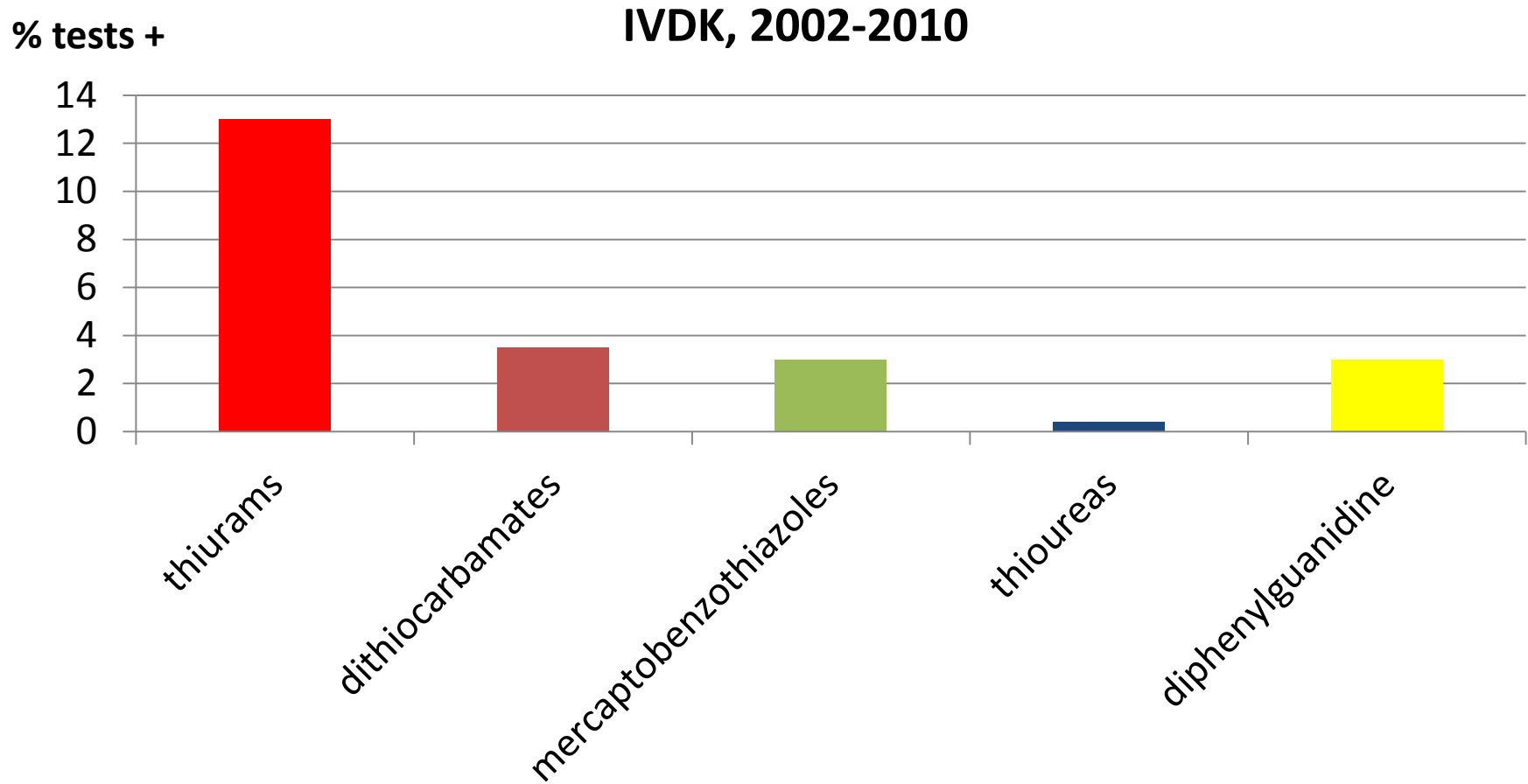
Thioureas

dithiophosphates

Xanthates

(N-(Cyclohexylthio)-
phthalimide)

Occupational ACD to rubber gloves



Geier 2012

N= 3448 tested patients for suspected glove allergy

thiurames/dithiocarbamates : fast accelerators

1. Thiurams :

- Thiurams replaced by dithiocarbamates in gloves
- Thiuram-mix : the best marker of thiuram/dithiocarbamate allergy

2. Complex chemical reactions between thiurames and dithiocarbamates :

Thiurams disulfides and dithiocarbamates = redox pair

(Hansson. CD 2014)

Guanidines

- 1,3-diphénylguanidine (gloves...) :
prevalence ↗



©Crépy MN APHP



© Pr Baeck M. U.C.L

Thiourea :
allergens of
polychloroprene
rubber



Antioxydants

Amines (IPPD..., quinolins)

phenols

dithiocarbamates

Mercaptobenzimidazole
derivatives





© Dr Baeck M. U.C.L

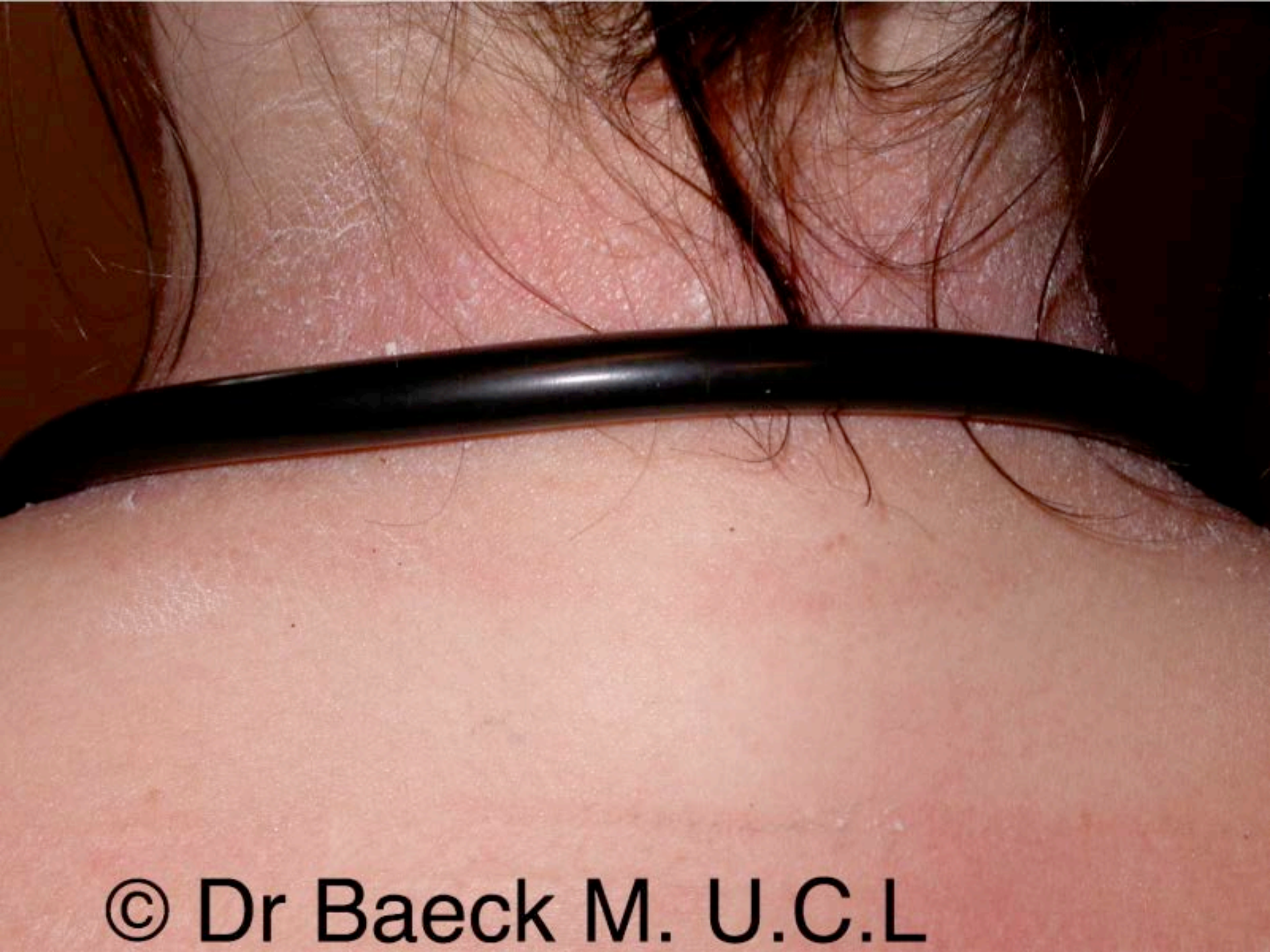


© Dr Baeck M. U.C.L





© Dr Baeck M. U.C.L



© Dr Baeck M. U.C.L



© Dr Baek M. U.C.L



© Dr Baeck M. U.C.

Others

```
graph TD; A[Others] --> B[plasticiser]; A --> C[surfactants]; A --> D[biocides]; A --> E[Colouring agents]; A --> F[others];
```

plasticiser

surfactants

biocides

Colouring
agents

others

Cetylpyridinium chloride : biocide

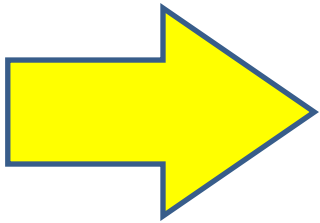
- Eczema (*Ponten, Castelain...*)
- *Donning agent*

3) New rubber gloves



Low protein latex gloves

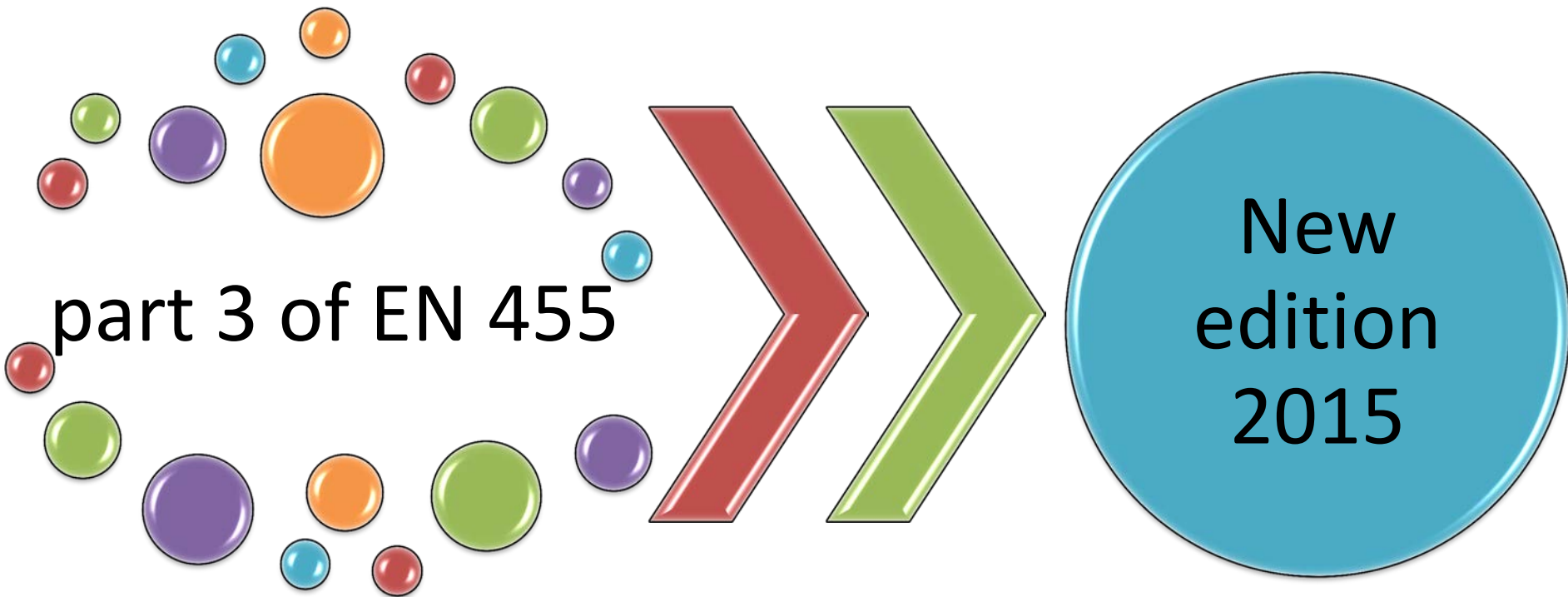
- low-allergens and powder-free medical gloves



successful prevention of NRL-allergy.

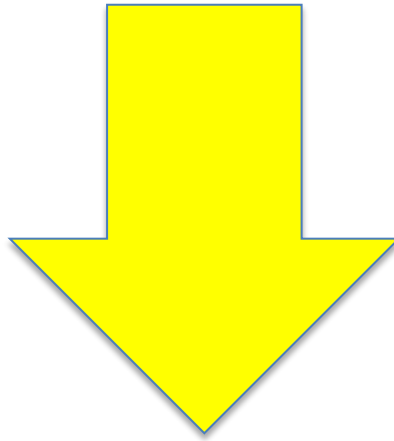
- Significant decline in the occurrence of NRL allergy

Rubber accelerator-free gloves



Accelerator-free gloves

may only be labelled as such



if in **no part of the manufacturing process**
accelerators are used

Different materials

- Polychloroprene : surgical gloves
- Nitrile : examination gloves
- Polyisoprene with photocrosslinking process : surgical gloves
- Thermoplastic elastomer gloves SEBS : surgical gloves



Different antimicrobial agents

- didecyldimethylammonium chloride
- Benzalkonium chloride
- chlorhexidine gluconate

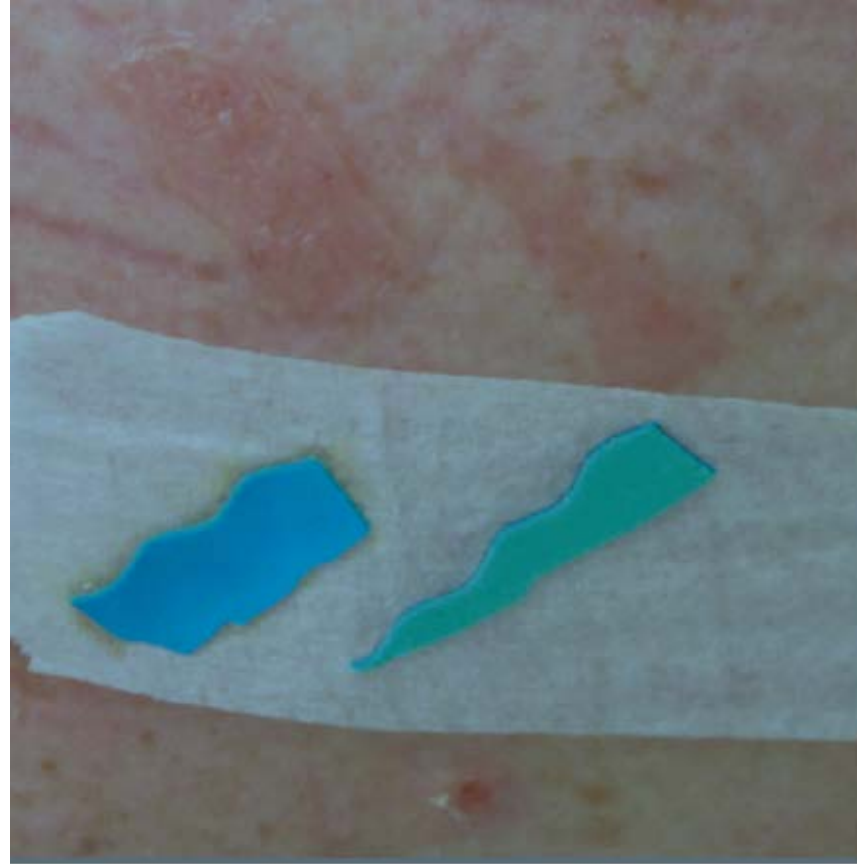
Moisturizers in gloves !!!

Severe allergic contact dermatitis caused by a rubber glove coated with a moisturizer

Katrien Vanden Broecke¹, Erik Zimerson², Magnus Bruze² and An Goossens¹



- Gloves analysis :
 - fatty alcohols
 - quaternary ammoniums
- positive patch test :
 - fatty alcohols
 - quaternary ammoniums



Guayule (*Parthenium argentatum* Gray)

- alternatives to *hevea brasiliensis* latex



Conclusion

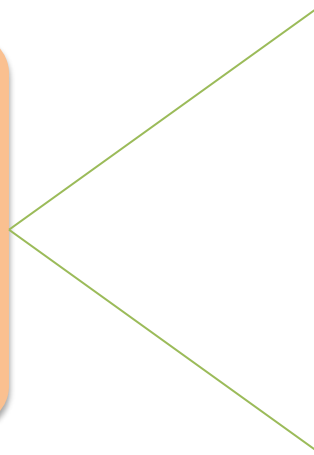
Latex proteins

Natural rubber
latex gloves

Vulcanisation
additives

Natural rubber
latex gloves

Synthetic
gloves



Accelerator-
free medical
gloves

A green arrow pointing from the green box towards the central red circle.

Biocides in
specific
surgical glove

A purple arrow pointing from the purple box towards the central red circle.

New
gloves

A large red circle with a slight gradient, serving as the central focus of the diagram.