Diagnostic methods in dermatoallergology

Table 1.7. Types of hypersensitivity reactions (Gell and Coombs)

Type	I	II	III	IV
Name	**Anaphylaxis**	**Antibody-dependent cytotoxity**	**Immune complex disease**	**Delayed-type hypersensitivity**
Antigens	Allergens, usually soluble (drugs, foods arthropod toxins, pollens)	Blood cells, drugs, tissue antigens	Drugs, serum, microbial antigens, tissue antigens, inhaled antigens	Drugs, contact allergens, microbial antigens
Effectors	IgE on mast cells	IgG, IgM	Primarily IgG, forming immune complexes with antigens	Sensitized T cells
Mediators	Mast cell products	Complement, NK cells	Complement, neutrophils are attracted, cannot ingest complexes, discharge granules	Macrophages activated by T cell cytokines
Tissue reaction	Vasodilatation, increased vessel permeability, edema, smooth muscle contraction	Cytolysis, tissue destruction	Acute necrosis	Variable, ranging from acute dermatit to granulomatous responses
Time	Usually seconds to minutes	Hours	Minutes to hours (serum sickness starts at about 9 days)	Usually 24–48 h
Clinical examples	Anaphylaxis, angio-edema, allergic rhinitis, conjunctivitis	Transfusion reactions, hemolytic disease of newborn,	Serum sickness, lupus erythematosus, Arthus reaction,	Allergic contact dermatitis, tuber-culin reaction

Type I reaction skin tests

- **Prick test**

  allergen in a drop of solution,
  on forearm skin, pricked by a lancet

  indications: urticaria
  drug adverse reactions

  allergens: foods,drugs,latex,airborne
  allergens (HDM, pollen)

Prick test

Prick test

readings after:

10, 20, 30, (60) minutes

reaction: wheel/erythema in mm

example 5/10

Positive reaction: larger than negative control by more than 2mm +

5mm ++

10mm +++

Prick test

Type I reaction skin tests

- **Scratch test**

  similar to prick test

  forearm skin scratched, then a drop of allergen applied

  nonspecific reactions may occur

  risk of anaphylaxis higher

  not recommended

Type I reaction skin tests

- **Intradermal test**
- 0,03-0,05 ml of a sterile solution injected into the uppermost dermis
- High risk of anaphylaxis
- Positive control: histamine or codeine solution
- Negative control: saline solution

a b c

Fig. 12.28 a–c. Prick testing. **a** A lancet is used to prick the skin though the test material. **b** Several erythematous urticarial positive reactions are seen. **c** An intradermal test is demonstrated

are interpreted cautiously with respect to the patient's disease.

Provocation Tests. Allergens can be introduced in many ways. Tests should be done where emergency help is available. Food allergens can be tested by

Laboratory tests

- IgE (RIST,ELISA)
  normal under 100 IU/ml
  high in atopic diseaeses
  in parasitic diseases ,tu: Sezary Sy

- Specific IgE (RAST,ELISA)

  against: aeroallergens
  food
  drugs
  latex

Laboratory tests

- LTT - lymphocyte transformation test

  detection under microscope or by the incorporation of radioactive thymidine

- MIF test – macrophage inhibition test

  Ag/sT ly ---> MIF ---> inhibition of the migration of macrophages from capillary

- BDT basophile degranulation test

  morphologic changes of basophils after the contact with allergen

- Trombocytopenic index

Exposition/elimination tests

- Exposition tests

  urticaria, drug reactions

  food allergies – DBPCFC

- Elimination tests

  chronic urticaria – elimination diet

Patch tests

- Detection of a IV. type allergy reaction i.e. the cause of contact dermatitis
- Principle: the exposition of a small area of the skin to the suspected allergen
- Standardized concentration, amount, vehicle, time of exposition

Indications of PT

- Suspected ACD
- Suspected contact urticaria
- Suspected occupational dermatitis
- Hand ,face,leg dermatitis
- Each endogenous dermatitis nonresponding to treatment
- Eczema in histology

Contraindications of PT

- Acute phase of dermatitis
- Rashes in the tested area
- Suntanned skin
- Simultaneous immunosupresive treatment
- Toxic & poisonous substances
- Extremely high or low pH
- Relative KI: pregnancy

Allergens

- Anorganic and organic compounds
- After repeated contact with the skin may elicit contact dermatitis
- Senzitisation potencial varies
- Time of sensitisation (5 days-years)
- European baseline series

  The most common contact allergens in the population – now 30 allergens

- **European Baseline Series**

- **Compound** **Conc./Vehicle**

- 1. Potassium dichromate 0.5 pet
- 2. 4-Phenylenediamine 1.0 pet
- 3. Thiuram mix 1.0 pet rubbber products
- 4. Neomycin sulfate 20.0 pet
- 5. Cobalt(II) chloride hexahydrate 1.0 pet
- 6. Caine mix 5.0 pet
- 7. Nickelsulfate hexahydrate 5.0 pet
- 8. Hydroxyethymethylmetacrylate 5.0 pet
- 9. Colophony 20.0 pet adhesives, waxes
- 10. Paraben mix 16.0 pet
- 11. N-Isopropyl-N-phenyl-4-phenylenediamine 0.1 pet
- 12. Wool alcohols 30.0 pet
- 13. Mercapto mix 2.0 pet
- 14. Epoxy resin 1.0 pet plastics, glues
- 15. Balsam Peru 25.0 pet fragrances, flavorings

- **European Baseline Series**

- 16. phenolformaldehyde resin 1.0 pet glues
- 17. 2-Mercaptobenzothiazole 2.0 pet rubber
- 18. Formaldehyde 1.0
- 19. Fragrance mix 8.0
- 20. Sesquiterpenelactone mix 0.1 pet plants
- 21. Qaternium 15 1.0 pet
- 22. Propolis
- 23. 5-Chloro-2-methyl-4-isothiazolin-3-one 0.01
- 24. Budesonide 0.01 pet
- 25. Tixocortol-21-pivalate 0.1 pet
- 26. Methyldibromoglutaronitrile (1,2-Dibromo -2,4-dicyanobutane)
- 27. Lyral
- 28. Fragrance II mix
- 29. Methylisothiasolinone
- 30. textile dye mix

Special (additional) tests:

b) commercially available

occupational allergens :

Occupational series:

i.e. bakery , hairdressers ,cooling fluids , photographic chemicals ries,rubber additives series

others: dental series,leg series, shoe series,textile dyes

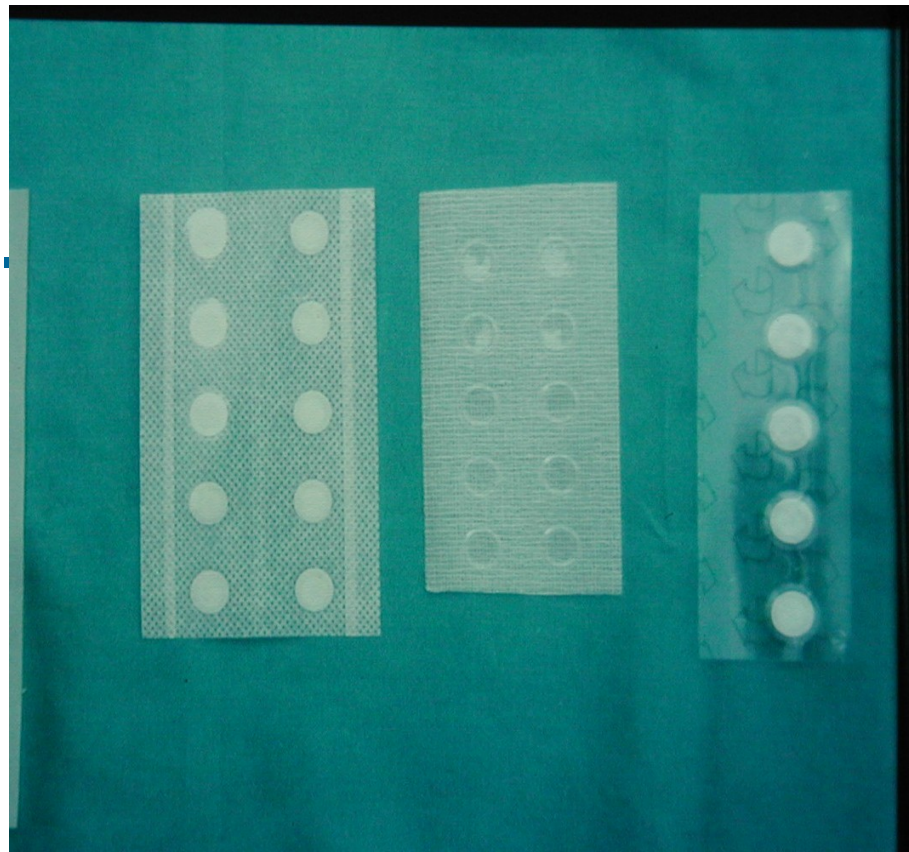
Special (additional) tests:

- According to the patient's history
  a) individually prepared
  proper concentration

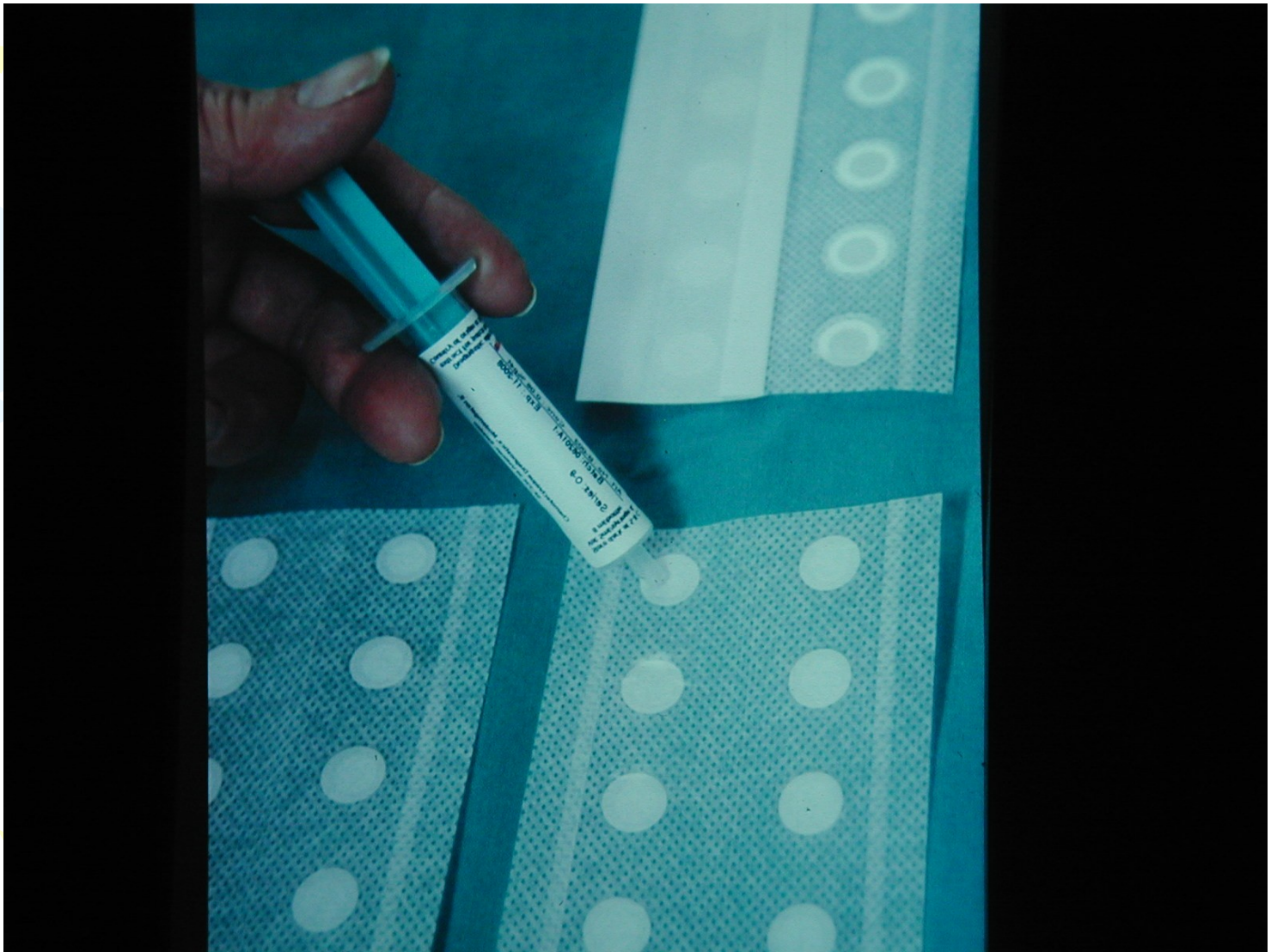
Syringes with allergens

Types of patches

- round filter patches
- plastic chambers
- round aluminium chamb.
- gel (TRUE tests)



Placing the allergens on the patches

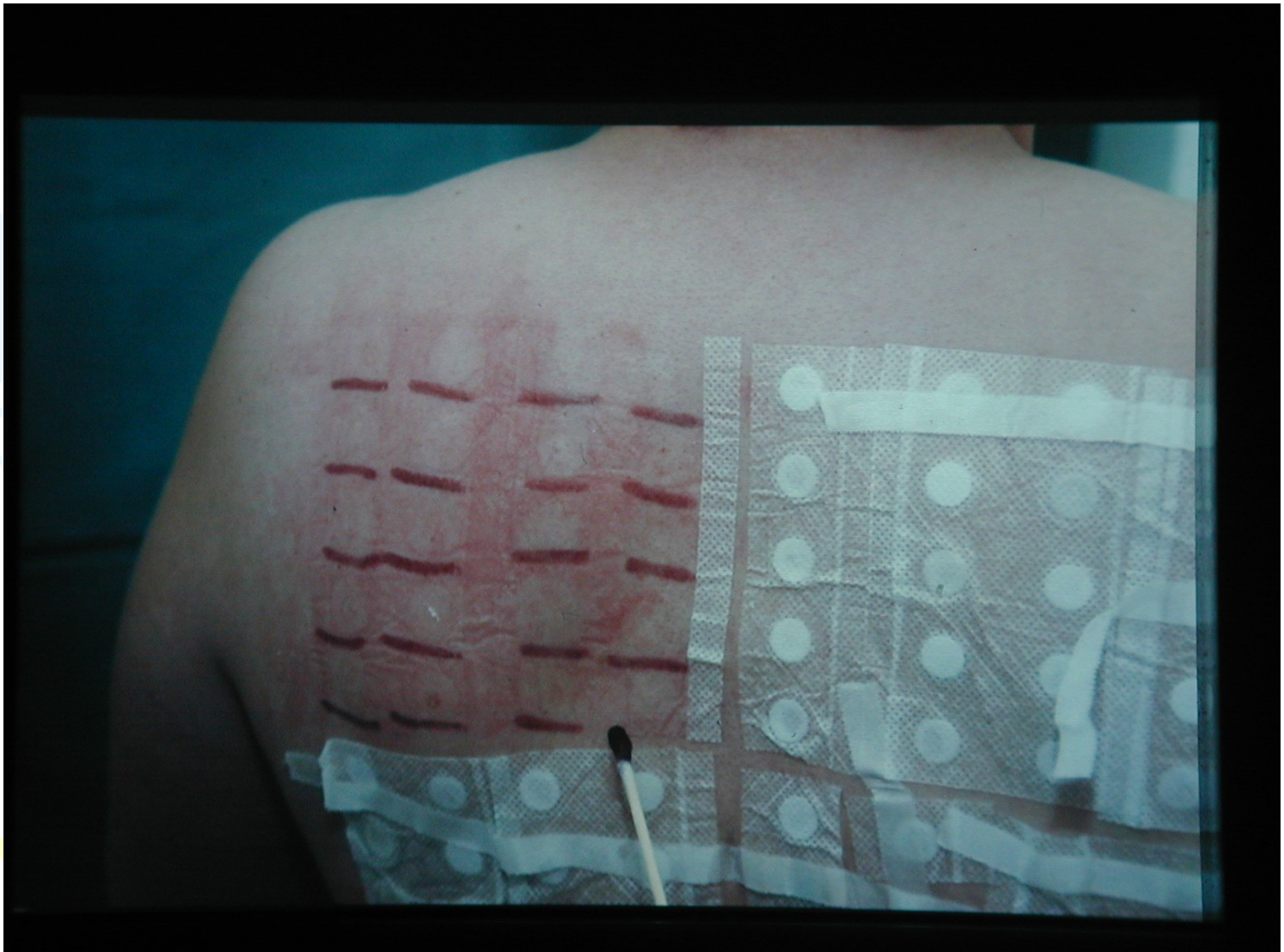


Ungreasing the skin with alcohol

Application of the tests

Fixing with adhesive tape

Removing & marking of the tests



Reading of the tests

- The dermatologist completes a record form at the second and third appointments (usually 48,72 and 96 hour readings)
- The result for each test site is recorded.

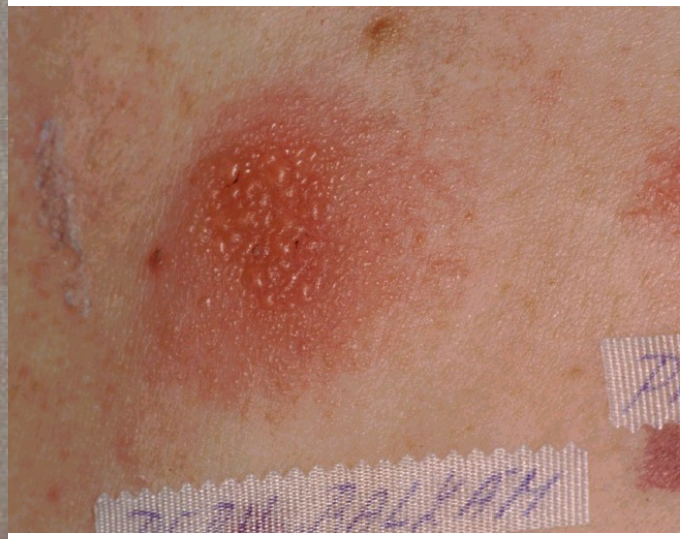
Reading of the tests

Reading of the tests

The system we use is as follows:

- Negative (-)
- Irritant reaction (IR)
- Equivocal / uncertain (+/-)
- Weak positive (+) erythema only
- Strong positive (++) papules
- Extreme reaction (+++) papulovesicles

+ vs. ++ vs. +++ reaction




IPPD
FRAGRANCE
PROPOLIS

Allergic vs. Irritant reaction

- Allergic reaction – papules, papulovesicles,extends beyond the borders of the patch
- itching
- Course of the reaction :

  crescendo type

  increasing reaction on consecutive days

Allergic reaction

Allergic vs. Irritant reaction

- Irritant reaction – redness,blisters or ulcers, sharply demarcated
- Pain rather than itching
- Decrescendo type

- The interpretation of the results requires considerable experience and training.

Irritant/toxic reaction

- Monovalent allergy: patient reacts to a single substance
- Oligovalent allergy: several substances,some may be chemically similar (group allergy),or arise from the same exposure (coupled allergy)

  f.e.sens. to nickel and chromium from jewelery
- Polyvalent: more than 5 positive reactions

Complications of patch tests

- Extremely strong reaction
- Flare up reaction
- Angry back syndrome
- Persisting reaction

  depo of allergen in the skin
- Sensitization by patch test

Angry back syndrome

6) Functional tests

- Dermographism after rubbing the skin
  - Red - vasodilatation
  - White – vasoconstriction-in atopics
  - Plastic – in factitial urticaria

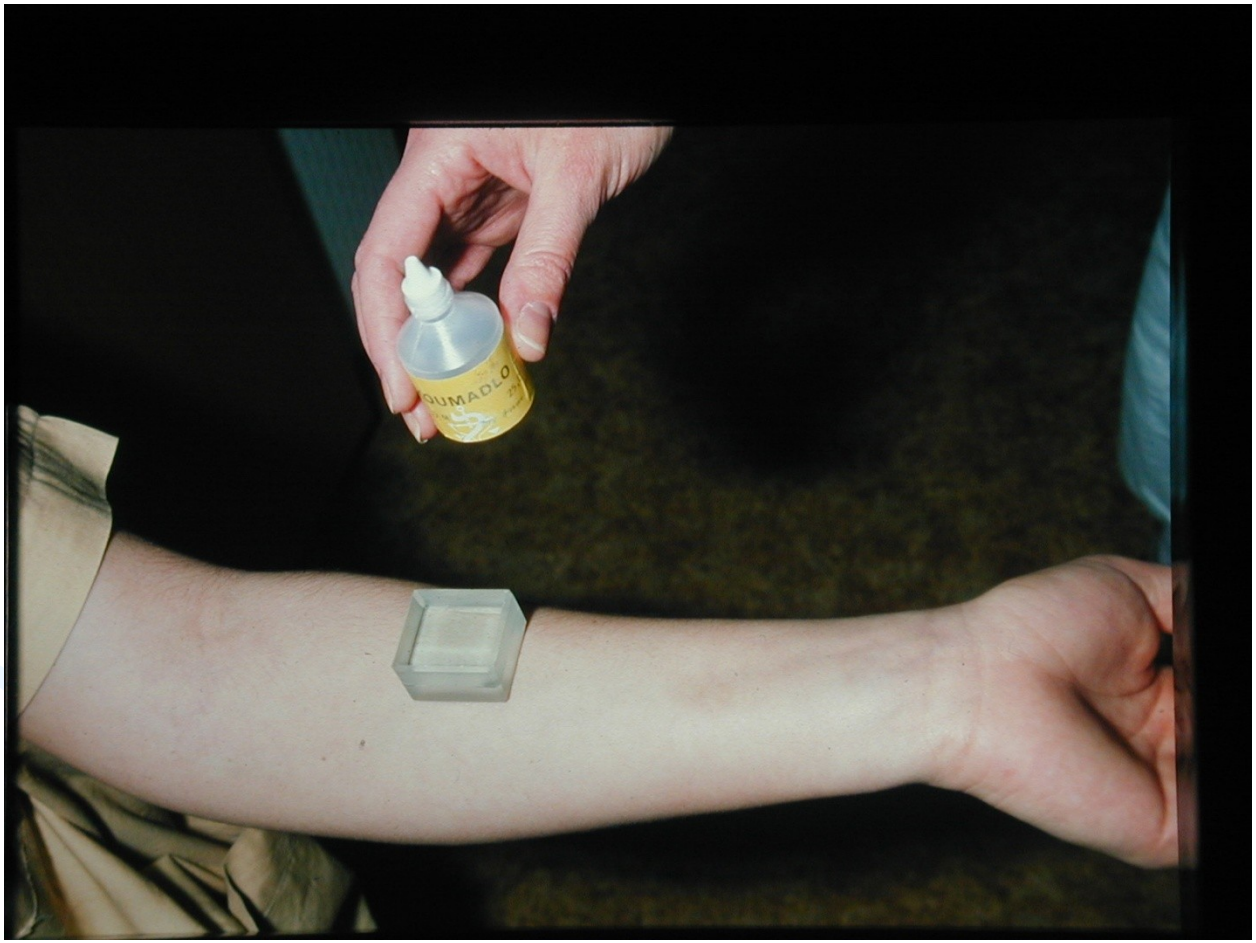
- Burckhardt test of alkali resistance

  assessing the barrier function of the skin

  exposure of the skin to 0.5 M sodium hydroxide under occlusion for 10-20-30min until erythema appears

0.5 M sodium hydroxide

Application under occlusion



Positive Burckhardt test