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# Dermatitis – diff. diagnosis I

## eczema x dermatitis

- Allergic contact dermatitis
- Irritant contact dermatitis
- Microbial eczema
- Seborrheic dermatitis

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- Atopic dermatitis

# 1. Allergic contact dermatitis

5 – 15% of all dermatoses

Prevalence – 1,5-3%

Incidence – 5-10 / 1000 per year

Hypersensitive reaction of the  
IVth type according to Coombs & Gell

# Allergic contact dermatitis

**Induction phase** Penetration of allergen through stratum corneum Interaction with APC

Phagocytosis of antigen  
subsequent expression of antigen on the surface of LC  
Migration to regional lymphatic nodes and presentation of the antigen to naive T-lymphocytes

# Allergic contact dermatitis

## Elicitation phase – in case of sensitization

proliferation of specific clone of effector

T-lymphocytes migration to the site of allergen penetration

Cytotoxic effect of T-lymphocytes releasing cytokines leading to inflammation

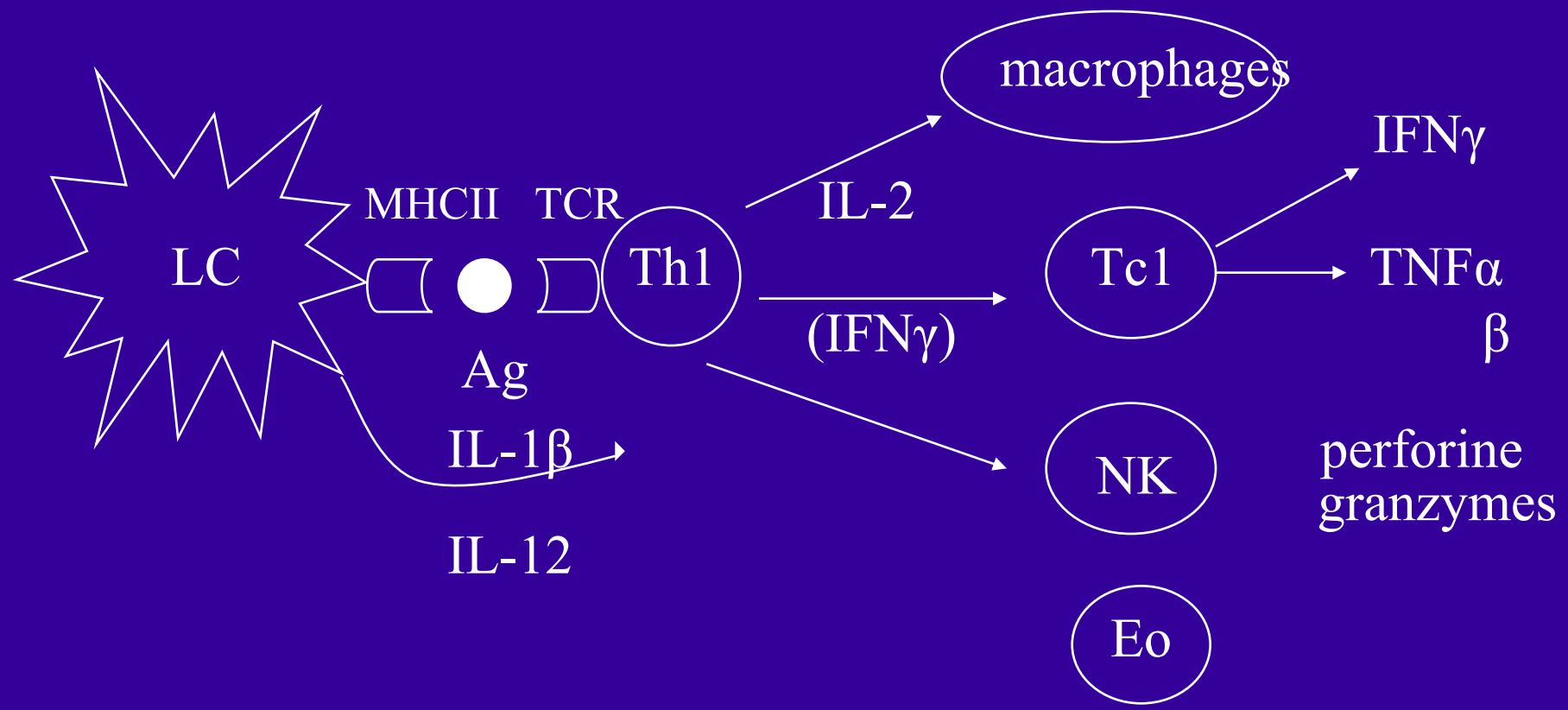
→ **allergic contact dermatitis**

**Shortest time to sensitization: 5-14 days**

migration of LC to regional LN takes about 5-24 hours

proliferation of T-lymphocytes: 5-10 days

# Patophysiology of the late-type hypersensitivity





# Diagnosis

- Patch tests
- Principle: exposition of a small area of the skin to the suspected allergen
- Standardized concentration, amount, vehicle, time of exposition (48 hours)

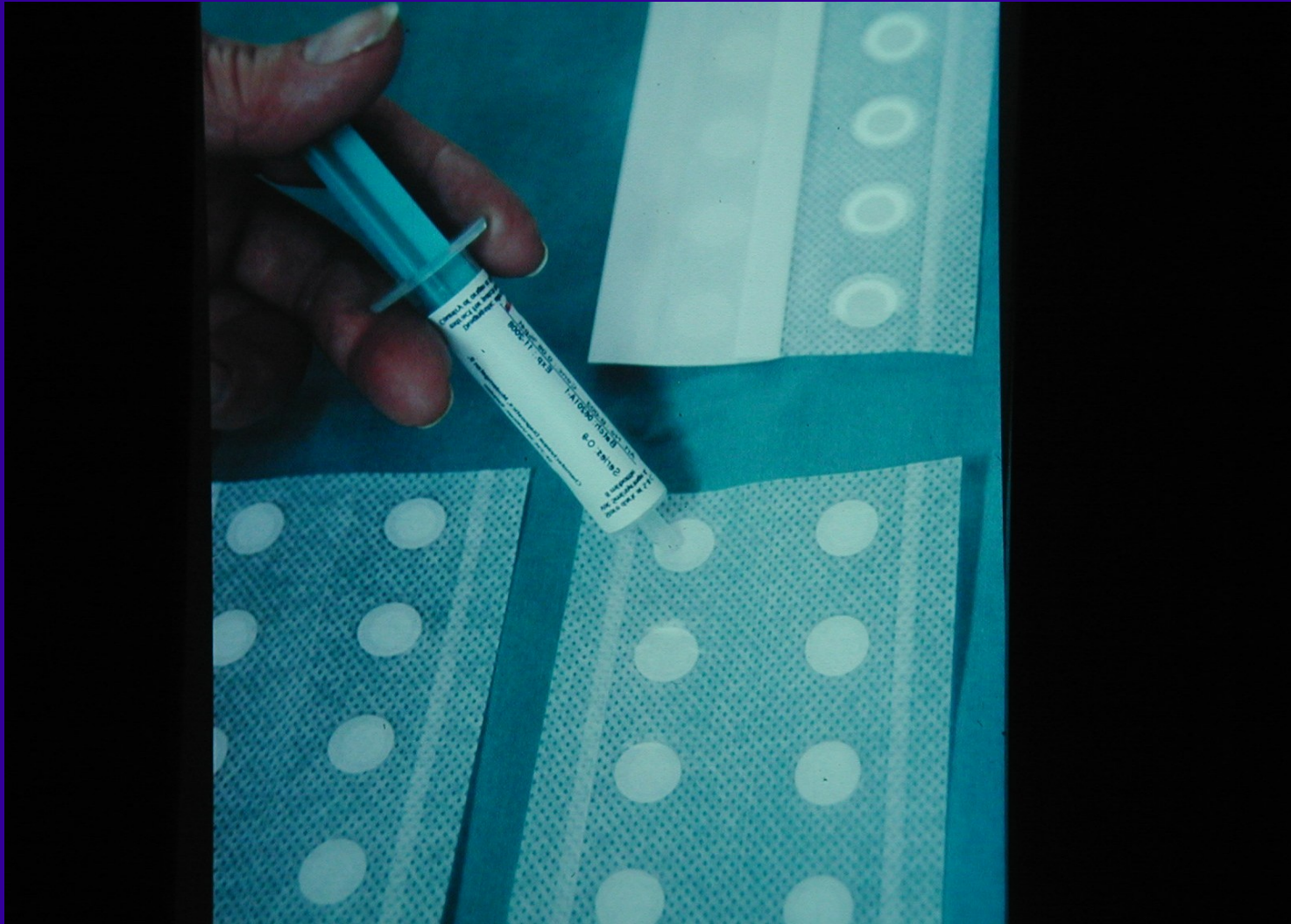


# Syringes with allergens



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# Placing the allergens on the patches





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# Application of the tests



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# Fixing with adhesive tape





# European Standard Series

- **Potassium dichromate 0,5 % pet.**
- **Neomycin sulphate 20 % pet.**
- **Thiuram mix 1% pet.**
- **Paraphenylenediamine 1% pet.**
- **Cobalt chloride 1% pet.**
- **Caine mix III 10% pet**
- **Formaldehyde 1% aq.**
- **Colophony 20% pet.**
- **Hydroxyethylmethacrylate 2% pet.**
- **Balsam of Peru 25 % pet.**
- **N-isopropyl-N-phenyl-4-phenylenediamine 0,1% pet.**
- **Wool alcohols 20% pet.**
- **Mercapto mix 2% pet.**
- **Epoxy resin 1% pet.**
- **Paraben mix 16% pet.**

# European Standard Series

- **P -4-t- butylphenol formaldehyde resin 1% pet.**
- **Fragrance mix 8% pet.**
- **Quaternium 15 1% pet.**
- **Nickel sulphate 5% pet.**
- **Kathon CG 0,01% aq.**
- **Mercaptobenzothiazole %pet.**
- **Sesquiterpenlactone mix 0,1% pet.**
- **Propolis 10% pet.**
- **Tixocortol-21-pivalate 0,1% pet.**
- **Budesonide 0,01% pet.**
- **Methyldibromoglutaronitrile (1,2-dibromo-2,4-dicyanobutane)**
- **Fragrance II mix 14% pet.**
- **Lylal 5% pet.**
- **Methylisothiazolinone 0,2% aq.**
- **Textile dye mix 6,6% pet.**

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# Special (additional) tests:

## b) commercially available

*occupational allergens :*

Occupational series:

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

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

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# Special (additional) tests:

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



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# Removing & marking of the tests

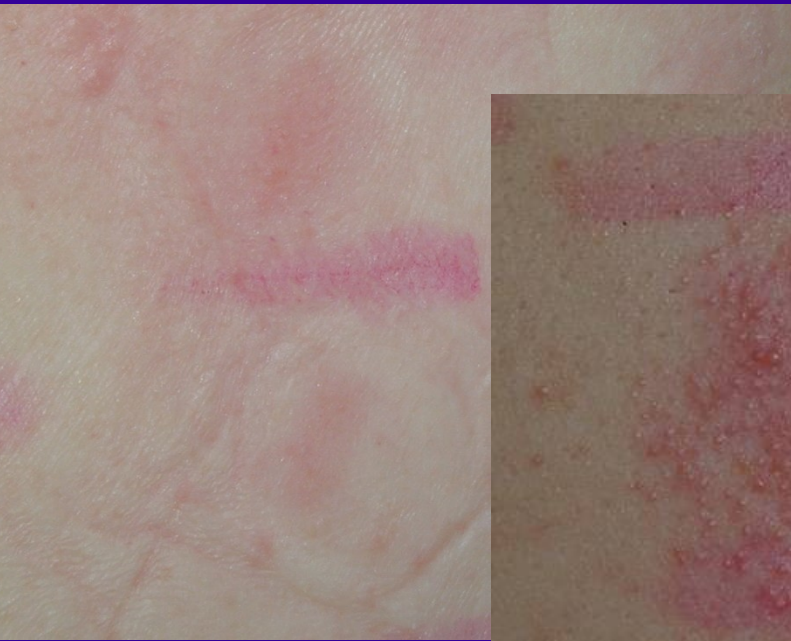




# Reading of the tests



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+ vs. ++ vs. +++ reaction



⋮  
⋮  
⋮  
Allergic vs. Irritant/toxic reaction



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# Angry back syndrome



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# Most common contact allergens

- 1. metals (nickel, chromium, cobalt)
  - 2. preservatives
  - 3. fragrances
  - 4. hair dyes
  - 5. acrylates – allergen of the year 2019
  - 6. plant extracts
  - 7. epoxide resin
  - 8. rubber chemicals
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Metal glasses



Metal ring

Allergic contact dermatitis – nickel



Metal watch



Metal button



Allergic contact dermatitis from **cobalt**  
& **nickel** coupled allergy



ACD to **chromium** from leather boots





# Kathon CG

Preservative, mixture of CMI and MI 3:1

- **cosmetics and other toiletries** (hair cosmetics, soaps, refreshing towels, toilet paper)  
since 2015 in the EU allowed only in cosmetic products for short-term skin contact –rinse off, concentration up to 15 ppm
- **household preparations** (washing and cleaning preparations, polishes)
- **industry** (adhesives, water-based paints, latex paints, cooling fluids etc. - there is no concentration limitation!)



Allergic contact dermatitis – **Kathon CG** (from cosmetic preparations), and to **methylisothiazolinone**, **octylisothiazolinone**



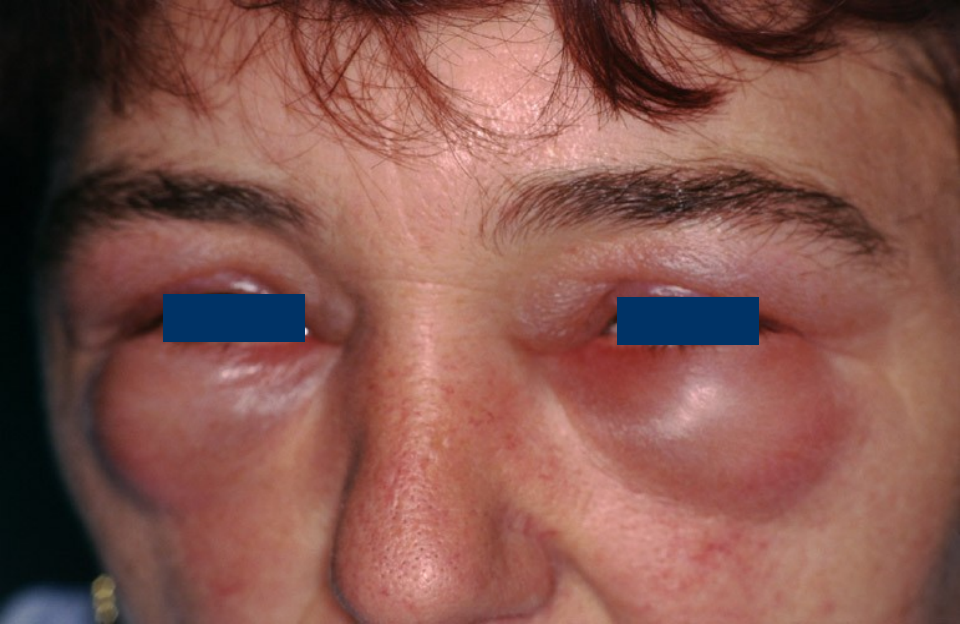
ACD - **IPPD**, antioxydant  
of black rubber



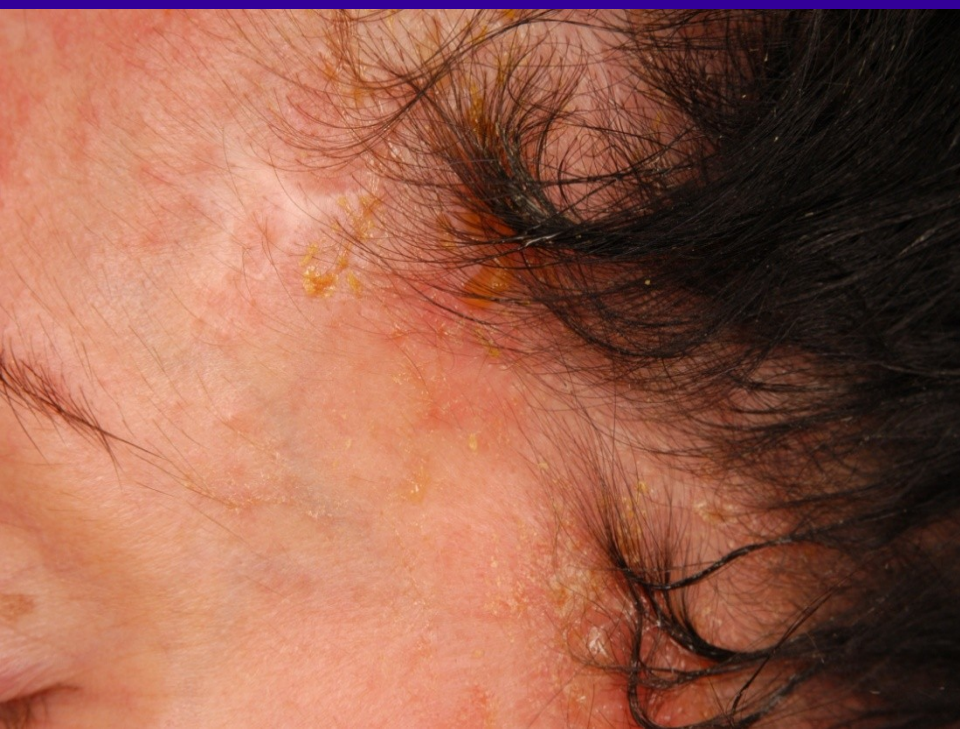
Tonometer, stethoscope  
(nurse)



Rubber boot



ACD to **PPD** from hair dyes



# Fragrances

## Fragrance mix I

- ❖ Cinnamic aldehyde
- ❖ Cinnamic alcohol
- ❖ myl-cinnamic aldehyde
- ❖ Eugenol
- ❖ Isoeugenol
- ❖ Geraniol
- ❖ Hydroxycitronellal
- ❖ Oak moss absolute (Akranorin)
- Sorbitan sesquioleate (emulgator)

## Frequency of sensitization:

worldwide

4,7-13,3%



**ACD to fragrance (eau de toilette)**





**Allergic contact  
dermatitis—  
fragrance —  
cosmetic cream**



**Patch tests —  
contact allergy to  
fragrance and  
cinnamic alcohol**





# Shared components in natural products

## Balsam of peru

- cinnamic alcohol
- cinnamic aldehyde
- cinnamic acid
- eugenol
- isoeugenol
- PABA
- benzylbenzoate
- benzaldehyd
- benzylalcohol
- colophony
- limonen
- vanillin

## Fragrance-mix I:

- cinnamic alcohol
- cinnamic aldehyde
- cinnamic acid
- eugenol
- Isoeugenol
- $\alpha$ -amylcinnamic aldehyde
- hydroxycitronellal
- geraniol
- oak moos absolute

## Propolis:

- Cinnamic alcohol
- Cinnamic acid
- Vanillin
- Caffeic acid
- 3-hydroxy-cinnamic acid
- 3-methoxy cinnamic acid
- Dimethyl caffeic acid

## Tea tree oil:

- terpinens
- d-limonen
- $\alpha$ -pinen
- 1,8-cineol
- $\delta$ -3-caren



Eczema contactum – propolis,  
balsam of Peru  $\alpha$ -amyl-cinnamic  
aldehyde, colophony



# Propolis

- natural product – is a resinous mixture that honey bees collect from tree buds, sap flows, or other botanical sources.
- The chemical composition of propolis varies depending on season, bee species and geographic location.
- Propolis has approximately **50 constituents**, primarily resins and vegetable balsams (50%), waxes (30%), essential oils (10%), and pollen (5%).
- Propolis has antibacterial, fungicidal, antipruritic and antiinflammatory effects and promotes epithelisation



**Allergic contact  
dermatitis–  
propolis (folk medicine  
preparations)**





Allergic contact  
dermatitis—  
**propolis** (folk medicine  
preparations)



# Tea Tree Oil

**source:** leaves of the tea tree (*Melaleuca alternifolia*)

**occurrence:** Australia, Spain, Portugal

**use:** folk /traditional/ medicine

**effects:** antiseptic

antifungal

antibacterial

# Components of Tea Tree Oil

Mixture of mono and sesquiterpens

❖ Terpinen-4-ol	30-45%	❖ 1,8 Cineol	0-15%
❖ Terpinen	10-28%	❖ Cadinen	stopa-8%
❖ Terpinen	5-13%	❖ Aromadendren	stopa-7%
❖ Terpeneol	1,5-8%	❖ Sabinen	stopa-3,5%
❖ Terpinolen	1,5-5%	❖ Globulol	stopa-3%
❖ Pinen	1-6%	❖ Viridiflorol	stopa-1,5%
❖ Cymene	0,5-12%	❖ β-Caren	stopa-0,2%
❖ d-Limonen	0,5-4%		

# Other plant extracts

## Compositae family

**main allergens - sesquiterpenolaktone**

Extr. Chamomillae - chamomile

Extr. Calendulae - marigold

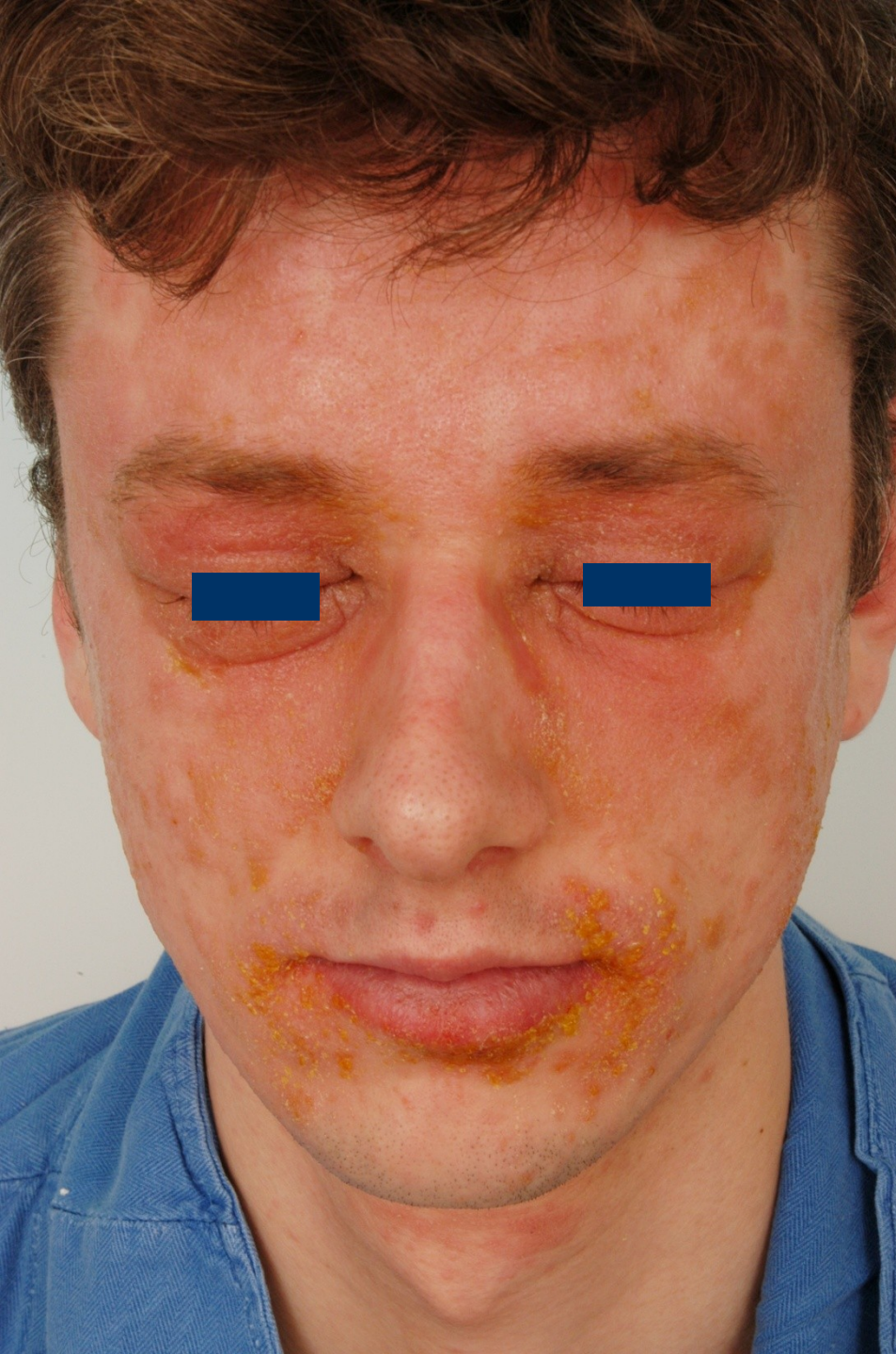
Extr. Arnicae - arnica

others:

Sunflower - Helianthus annuus,

Chrysanthemum, Cynia, Astra etc.





**ACD to marigold (extr. Calendulae)**

**ACD to marigold in the terrain of atopic dermatitis**





**Eczema contactum -  
chloramphenicol, extr.  
Chamomillae**



**Eczema atopicum et  
contactum - extr.  
Chamomillae**



**Eczema contactum -  
Neomycin, extr.  
Chamomillae**



**Allergic contact dermatitis – tea tree oil  
(cosmetic preparations)**



**Patch tests –  
contact allergy to  
tea tree oil and  
other etheric oils**

# Acrylates

- **Industry:** plastics, plexiglass, synthetic rubber, insulating materials, plasters, acrylic floors, adhesives, UV-cured paints, paints  
**Dentistry:** composite fillings, orthodontic appliances  
**Bone cement:** endoprostheses, osteosynthesis  
**Medical devices:** spectacle frames, patches, hearing aids, insulin pumps...
- **Cosmetic industry:** cosmetic industry  
acrylic nails, artificial eyelash adhesives

# Acrylates

- Monomers - high sensitizing potential  
Polymers (cured) do not sensitize  
but: risk of sensitization by contact with monomers created by secondary depolymerisation



# Nonsteroidal antiinflammatory drugs

**Ketoprofene** – derivative of propionic acid

## **Ketoprofene – topical**

Fastum  
Profenid gel  
Ketonal crm  
and others

## **systemic**

Ketoprofen tbl,sup  
Ketonal cap,sup amp i.m.  
Ketonal forte tbl  
Ketonal ret tbl  
Profenid cps,tb,sup amp  
Profenid 100 mg pro inf  
Toprec tbl

Allergy potentiated by sun exposure – photocontact allergy



**Photocontact allergy - ketoprofene  
(Fastum gel)**



**Patch test -  
alergická reakce  
na Fastum gel**



**Patch test -  
alergická reakce na  
ketoprofene**

**Photocontact allergy - ketoprofene -  
generalizace (Fastum gel)**

# Corticosteroids

## A - type Hydrocortisone:

D ring unsubstituted, C 20, C 21 unsubstituted or C 17, C 21 short chain (acetates or esters), possibly. C 21, thioester

## B - type Triamcinolone acetonide:

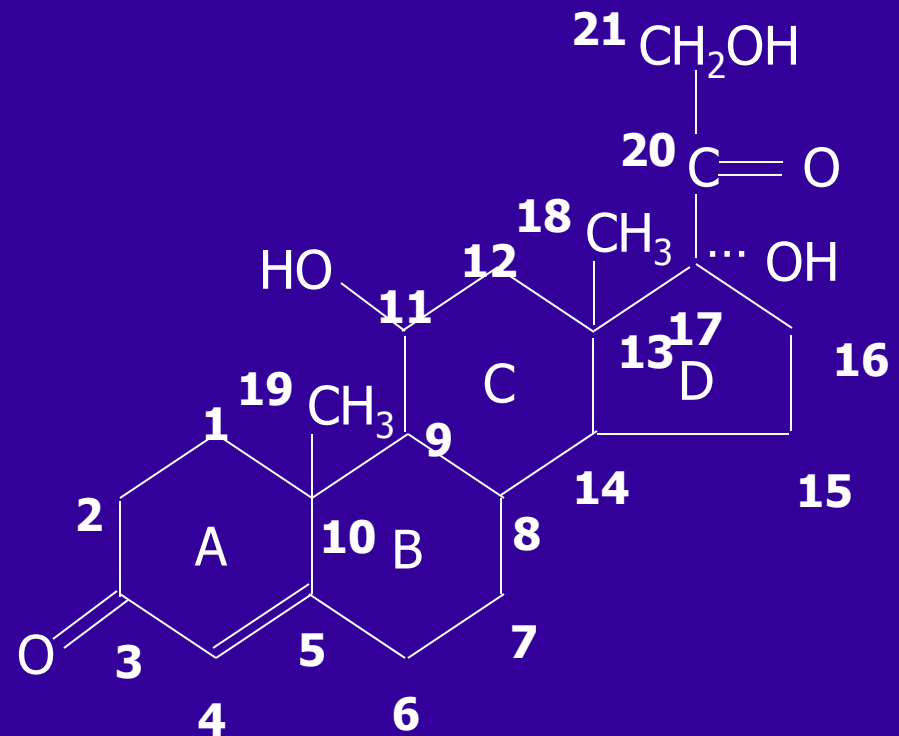
C 16, C 17 cis-ketal structure or diol structure

## C - type Bethametasone:

C 16 methyl substitution

## D - type Hydrocortisone butyrate:

C 17, and / or C 21 long ester chains, possibly. C 16 methyl substitution







Patch test—  
contact  
allergy to  
**Budesonide**

**Budesonide** - Apulein ung, crm, liq, Pulmicort aer inh,  
Pulmicort, Turbuhaler plv inh, Rhinocort spr nas

Budesonid 1%

Betamethasoni dipropionat 0,025%

72h.

ec. 2%

Budesonid 0,025%

Rhinocort spray 72h.

ison ec. 1%

Hydrocortison

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## 2. Irritant contact dermatitis

- Nonallergic reaction
- Dose dependent
- Exposition to exogenous more or less toxic agent
- More common than allergic contact dermatitis



# Irritant contact dermatitis

## Causes:

- **chemical agents:**
  - alkaline & acid solutions
  - organic solvents (toluene...)
  - detergents
  - disinfectants
  - food stuffs (fruit acids, mustard...)
  - even water
- **physical agents:** UV radiation, heat, cold, mechanical factors



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# Clinical picture

- Lesion sharply bordered
- intensity depends on the toxicity of the substance (more toxic.. more acute reaction)

- Toxic agents:

redness – swelling - blisters - necrosis

- Less toxic agents – chronic ICD

redness, scales, lichenification, hyperkeratosis

# Acute ICD



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# Chronic ICD



# Treatment of ACD & ICD

## Topical corticosteroids

### Class I - low potency CS

HCT acetate (HCT ung.), DXM acetate (DXM crm.)

### Class II mid-potent CS

HCT butyrate (Locoid crm., lotio), TMC acetonid (TMC crm.), alclomethason (Afloderm crm, ung.)

prednicarbate (Dermatop crm., ung.)

methylprednisolon aceponate (Advantan crm.)

### Class III - potent CS

betamethasone dipropionate (Beloderm, Diprosone crm.)

fluocinolone acetonide ( Gelargin gel, ung.)

momethason furoate ( Elocom crm., ung., lotio)

### Class IV – very potent CS

clobethasol propionate (Dermovate crm., ung)

Antihistamines, systemic corticosteroids – short courses



### 3. Microbial eczema

Allergy of IVth type to bacterial allergens –  
mostly to Staph. aureus  
appears mostly secondary:

in pyodermas, scabies, atopic dermatitis, ICD  
around fistulas, stomias, in varicous terrain on legs  
around sites of inflamamtion (chronic rhinitis, otitis)

variant: **nummular dermatitis** (coin shaped  
patches and/or plaques) usually in patients with  
focal bacterial infection (tooth gfranuloma, chronic  
tonsillitis, chronic urogenital infections etc.



**Microbial eczema**



**Microbial eczema**



**Microbial eczema in patients with CVI  
= varicous eczema**



**Microbial eczema in a patient  
with chronic otitis**



**Microbial eczema in a patient  
with scabies**

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# Treatment of microbial eczema

## Acute phase:

- Drying compresses
- Topical zinc preparations
- Topical corticosteroids in lotion base

## Subacute and chronic phase:

- ATB paste, endiaron paste, tar preparations
- Combination with topical CS (TMC-E, Belogent, Fucicort)

## Systemic ATBs

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# 4. Seborrheic dermatitis

- **localisation:** seborrheic predilection sites
- **etiology:** genetic predisposition, hormonal status  
dysseborrhea – altered composition of sebum  
**Malassezia sp.** = pityrosporon ovale  
immunodeficiency - AIDS  
depletion of zinc, comorbidities

Clinical picture: erythematous scaly lesions

Typical sites: scalp, eyebrows, nasolabial folds,  
midchest region, around umbilicus, groins & axillae

- Subjective complaints: itching, burning







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# Treatment of seborrheic dermatitis

- Topical imidazole antifungals + topical corticosteroids
- Topical immunomodulators (off label)
- Topical imidazole antifungals
- Topical preparation with zinc
- zinc supplementation
- Systemic antifungals

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