



# Common skin infection in children

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# Instruction for online lecture

## 1. Online lecture (duration 40-45 นาที)

## 2. Post-test

- ◆ Log in to E-learning KKU รายวิชากุมารเวชศาสตร์ 1
- ◆ เลือกหัวข้อ Dermatology
- ◆ ระบบจะเปิดให้ทำ Quiz วันเดียวกันกับตารางเรียน  
เวลา 15.00-15.30 นะคะ
- ◆ Submit คำตอบภายในเวลาที่กำหนด
- ◆ ข้อสอบ 10 ข้อ เวลาในการทำข้อสอบ 5 นาที

**อย่าลืม submit คำตอบภายในเวลาที่กำหนดนะคะ**





# Common skin infection in children

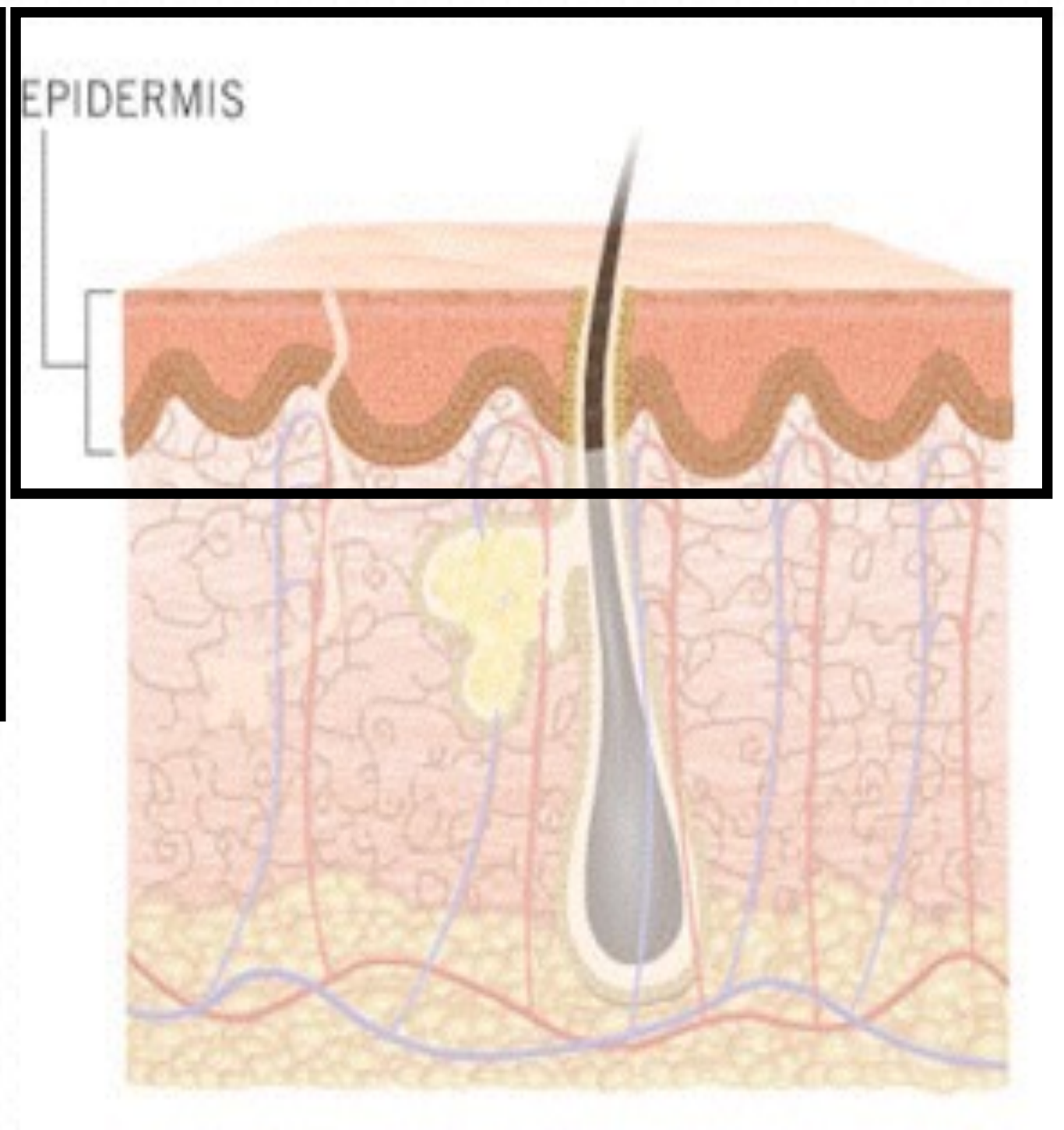
## *Scope of the presentation*

- ✓ **Bacterial infection**
- ✓ **Viral infection**
- ✓ **Superficial fungal infection**
- ✓ **Parasite infestation and insect bite**





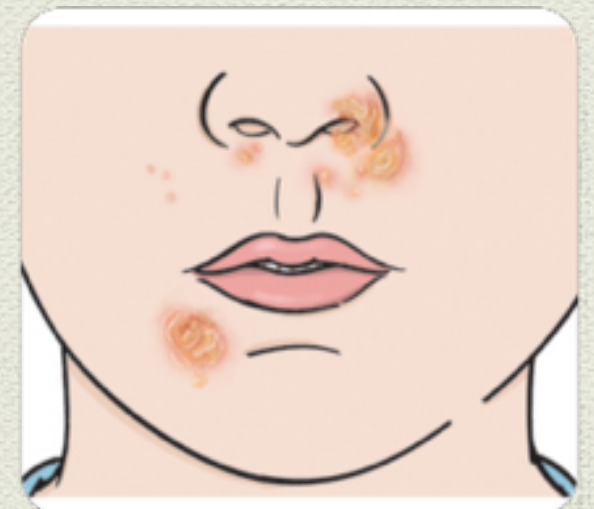
- Epidermis
  - Stratum corneum
  - Stratum granulosum
  - Stratum spinulosum
  - Stratum basale
- Dermis
- Subcutaneous fat





# Common bacterial skin infection

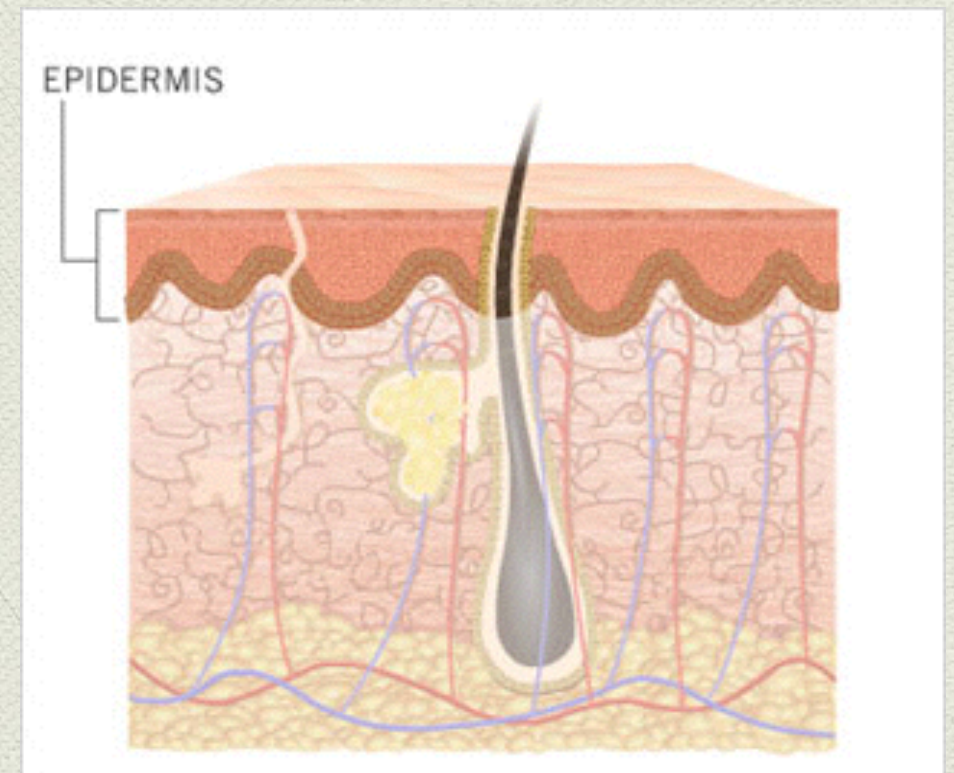
- Impetigo
- Ecthyma
- Erysipelas
- Cellulitis
- Staphylococcal scalded skin syndrome





# Impetigo

- Infection of subcorneal epidermis
- Common, highly contagious
- Direct person-to-person





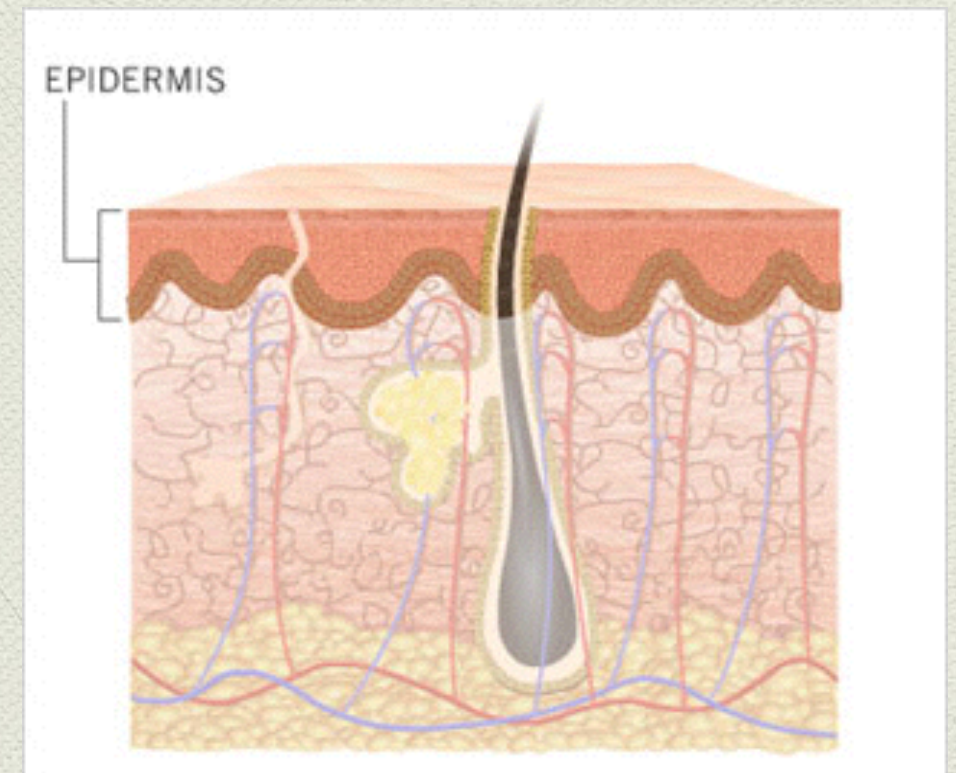
# Impetigo

## *2 clinical forms*

### ✓ Nonbullous impetigo

- ▶ common impetigo
- ▶ crusted impetigo
- ▶ impetigo contagiosa

### ✓ Bullous impetigo





# Nonbullous impetigo

## Impetigo Contagiosa -- Common

70% of all cases of impetigo

Most common : *Staphylococcus aureus*

Minor group : *Streptococcus pyogenes*

**Vesicles or pustules golden colored  
yellow crusts stuck on  
erythematous papules or plaques**





# Bullous impetigo

- Always from *Staphylococcus aureus* (especially Phage group 2 strain 77,55)
- Exfoliative toxin / Epidermolytic toxin
- Most common in neonates
- Associated symptoms: weakness, fever, diarrhea



Vesicles on face, trunk, buttock, perineum, and extremities enlarge to flaccid bullae without surrounding erythema



**Flaccid bullae**



**Honey color crust on  
erythematous base**

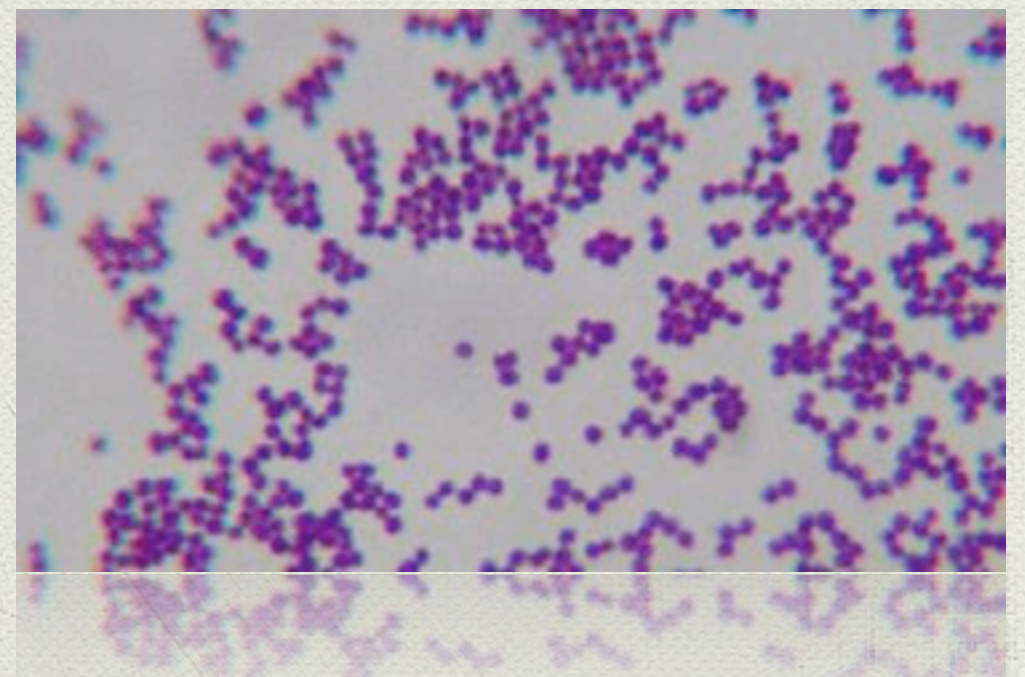




# Impetigo

## Diagnosis

- Clinical symptoms
- Gram's stain
- Culture (unnecessary)





# Treatment

- Local skin care:
  - ▶ Wet dressing: NSS
  - ▶ Topical antiseptics: Hibiscrub
- Antibiotics:
  - ▶ Topical antibiotics:
    - 2% Mupirocin (Bactroban)
    - Fusidic acid (Fucidin)
  - ▶ Systemic antibiotics





# Systemic Antibiotics

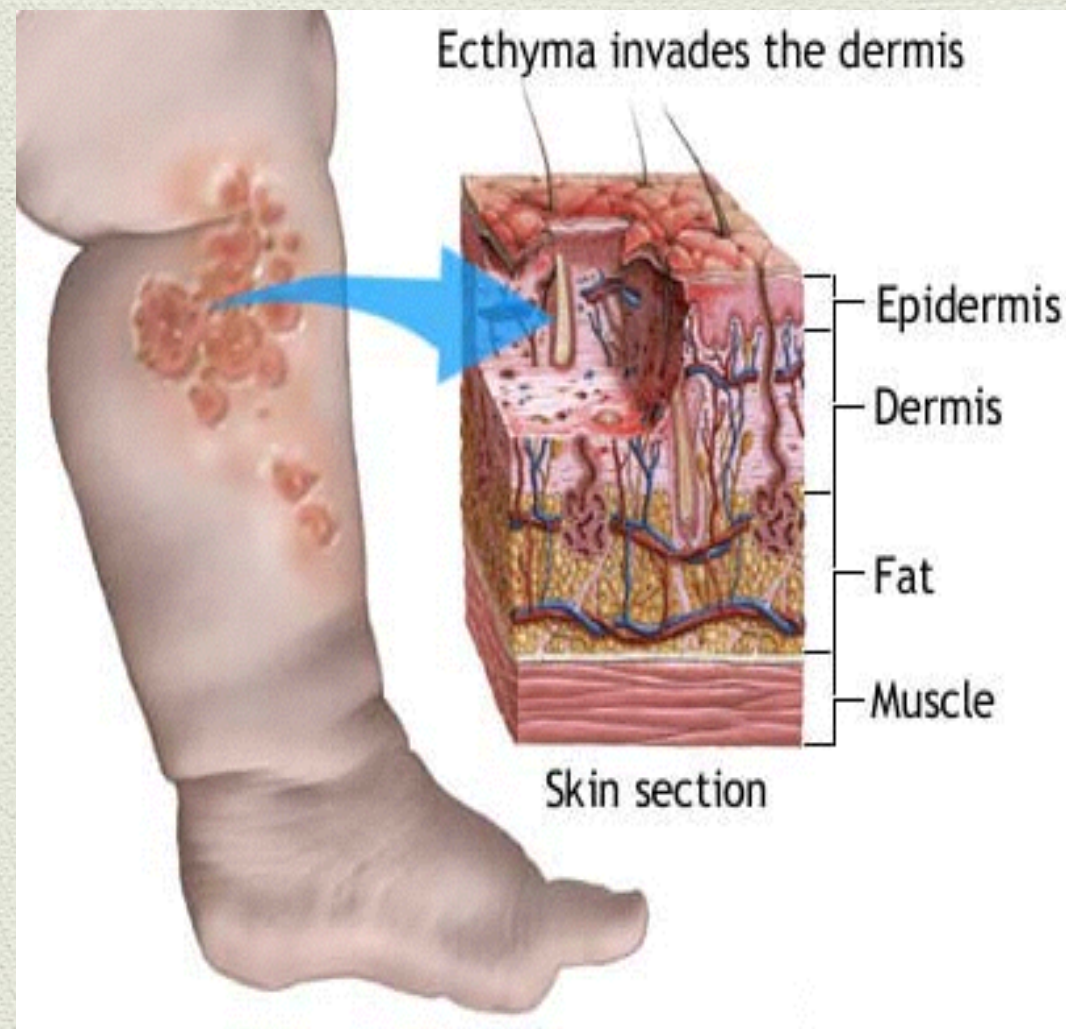
- **Penicillinase-resistant penicillin:**
  - ▶ Cloxacillin 50-100 mg/kg/d divided in 4 times for 7-10 d
  - ▶ Dicloxacillin 25-50 mg/kg/d divided in 4 times for 7-10 d
- **Cephalosporin:**
  - ▶ Cephalexin 25-50 mg/kg/d divided in 3-4 times for 7-10 d
- **Beta-lactam/ Beta-lactamase inhibitor:**
  - ▶ Amoxycillin/clavulanate 20-40 mg/kg/d divided in 2-3 times 7-10 d
- **Macrolides: penicillin allergy**
  - ▶ Erythromycin 30-50 mg/kg/d divided in 4 times for 7-10 d





# Ecthyma

Ulcerated form of nonbullous impetigo

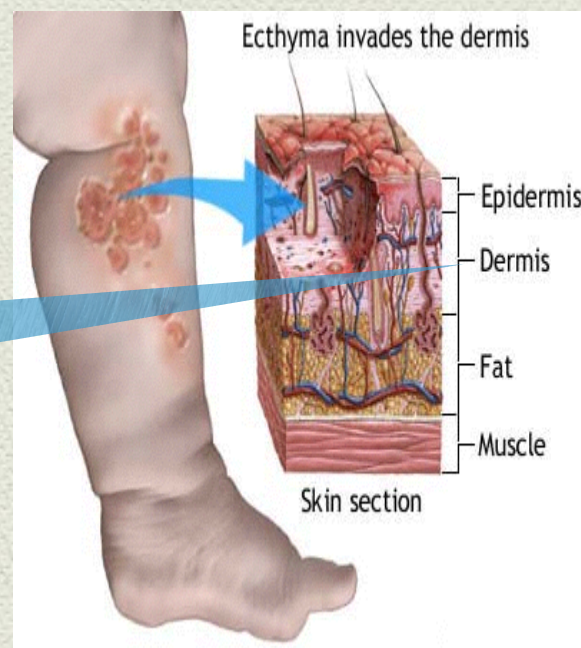




# Ecthyma

- Organism
  - ▶ Most common group -- ***Streptococcus pyogenes***
  - ▶ Minor group -- *Staphylococcus aureus*
- Vesiculopustular eruption --crusted lesion to punched out ulcer
- Slow to heal in several weeks and produce scarring

Scar !!!



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# Ecthyma

- Complication
  - ▶ Nephritogenic strain of Group A  $\beta$ -hemolytic streptococci can result in **acute glomerulonephritis**
- Diagnosis & treatment : same as impetigo



# Erysipelas

- Etiology
  - ▶ *Streptococcus pyogenes* (GABHS)
- Clinical
  - ▶ warm, shiny, bright-red, confluent
  - ▶ indurated, tender plaque
  - ▶ peau d'orange appearance and elevated margin





# Cellulitis

- Etiology:
  - ▶ Most common: *S. pyogenes* and *S. aureus*
  - ▶ Newborn: GBS and *E. coli*
- Clinical
  - ▶ Area of edema, warmth
  - ▶ Erythema and tenderness
  - ▶ Indistinct border: differ from erysipelas





# Cellulitis



- ◆ **Orbital cellulitis**
- ◆ **Medical emergency**
- ◆ **Require ophthalmologist consultation**



# Diagnosis and treatment

- Diagnosis based on
  - ▶ Clinical symptom
  - ▶ CBC (leukocytosis, left shift)
  - ▶ Gram stain, Culture
- Treatment:
  - ▶ Supportive Rx
    - Warm compression
    - Wet dressing
  - ▶ **Parenteral ATB for 10-14 d**





# Staphylococcal scalded skin syndrome (SSSS)

- Predominantly in infants and children under 5 years of age
- Etiology
  - ▶ *Staphylococcus aureus*
  - ▶ Produce exfoliative toxin (ET) : ETA, ETB
- Foci of infection
  - ▶ nasopharynx, umbilicus, urinary tract
  - ▶ cutaneous wound, conjunctivae
  - ▶ blood

Fever, irritability with generalized erythroderma  
Periorificial crust around the mouth, eyes & nose  
Widespread denudation with positive Nikolsky's sign











**Peri-orificial  
desquamation**





## **Nikolsky's sign positive**

Slight rubbing of the skin  
results in exfoliation  
of the epidermis





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# SSSS

Perioral desquamation

No mucosal involvement



# SJS

Mucosal involvement



# *Staphylococcus aureus*



## **“Exfoliative toxin”**

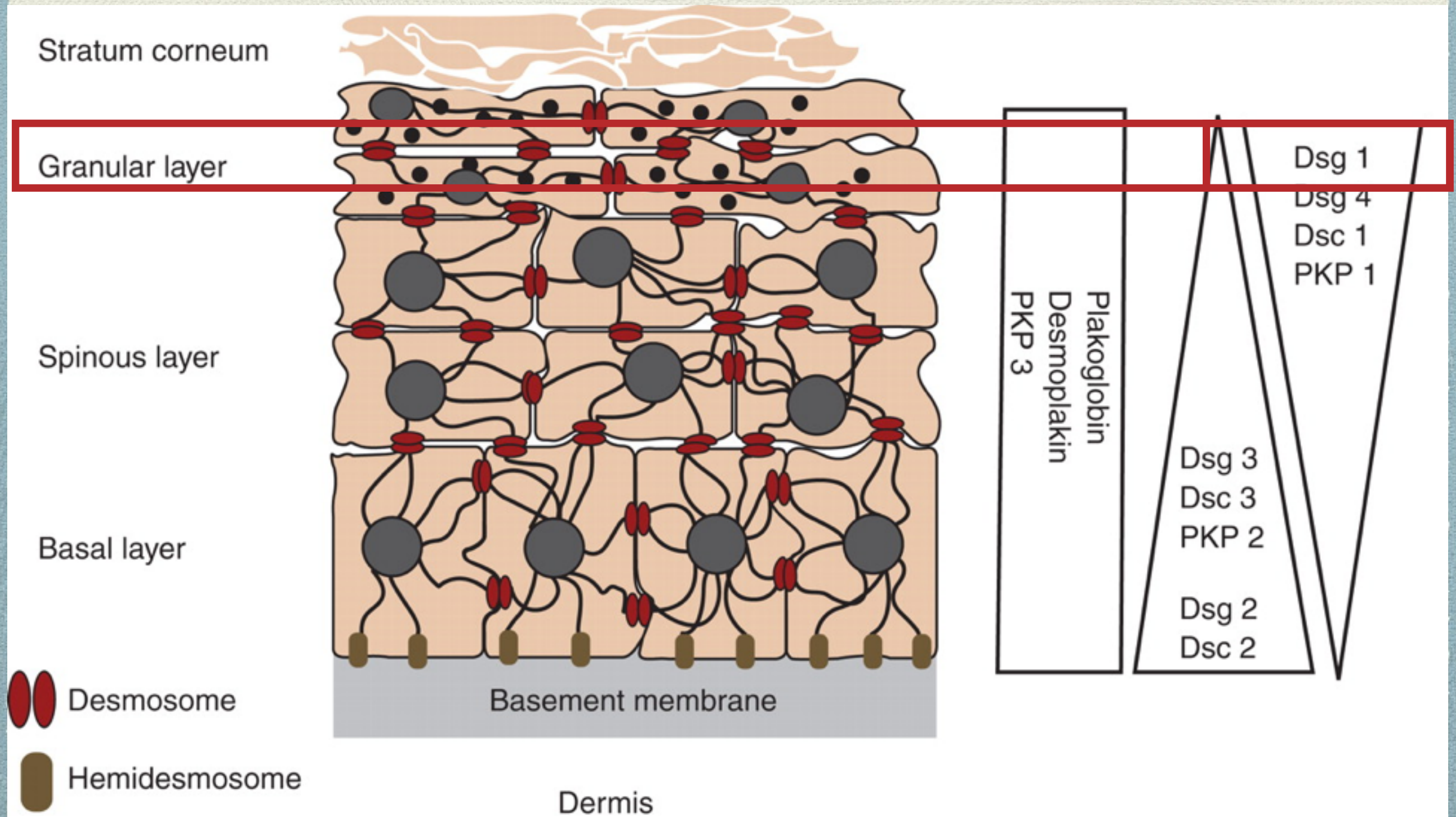
- ◆ Exfoliative toxins (also known as “epidermolytic” toxins)
- ◆ Specific serine proteases recognize and cleave desmosomal cadherins (on skin layers)
- ◆ Desmoglein-1

## **What is desmosome?**

- ◆ Intercellular junctions that provide strong adhesion between cells
- ◆ Because they also link intracellularly to the intermediate filament cytoskeleton
- ◆ They form the adhesive bonds in a network that gives mechanical strength to tissues



# What is Desmosome?





# *Staphylococcus aureus*



## **“Exfoliative toxin”**

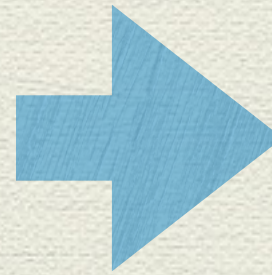
- ◆ Exfoliative toxins (also known as “epidermolytic” toxins)
- ◆ Specific serine proteases recognize and cleave desmosomal cadherins (on skin layers)
- ◆ Desmoglein-1



- ◆ Directly cause a clinical manifestation of staphylococcal scalded skin syndrome (SSSS)



Affected skin layer in SSSS



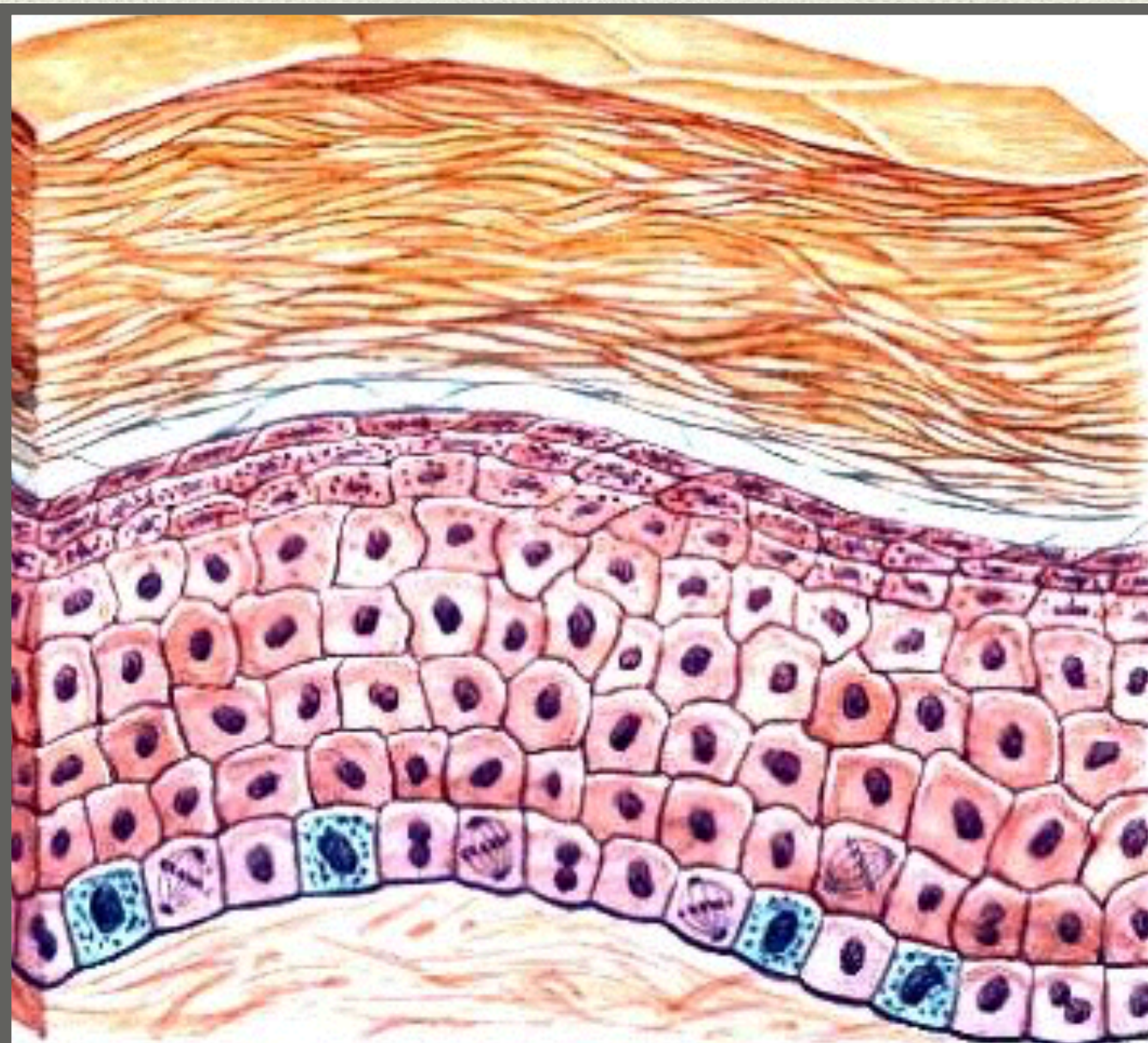
**Stratum granulosum**

**“Desmoglein-1”**

Place on superficial epidermis only,

**No mucosal involvement**

**(Mucosa: No desmoglein-1)**



**Stratum corneum**

Consists of many layers of keratinized dead cells that are flattened and nonnucleated; cornified

**Stratum lucidum**

A thin, clear layer found only in the epidermis of the lips, palms, and soles

**Stratum granulosum**

Composed of one or more layers of granular cells that contain fibers of keratin and shriveled nuclei

**Stratum spinosum**

Composed of several layers of cells with centrally located, large, oval nuclei and spinelike processes; limited mitosis

**Stratum basale**

Consists of a single layer of cuboidal cells in contact with the basement membrane that undergo mitosis; contains pigment-producing melanocytes



# Staphylococcal scalded skin syndrome

- Diagnosis
  - ▶ Mainly clinical
  - ▶ Culture from sites of infection
  - ▶ Culture from intact bullae are always negative





# Staphylococcal scalded skin syndrome

## Treatment

- Hospitalization
- Specific treatment:
  - ▶ Parenteral ATB 10-14 day
- Supportive treatment:
  - ▶ Wound care: gentle cleansing, apply emollient
  - ▶ Correct fluid and electrolyte disturbance
  - ▶ Prevent and early treat secondary infection





# Common bacterial skin infection

- Impetigo
- Ecthyma
- Erysipelas
- Cellulitis
- Staphylococcal scalded skin syndrome

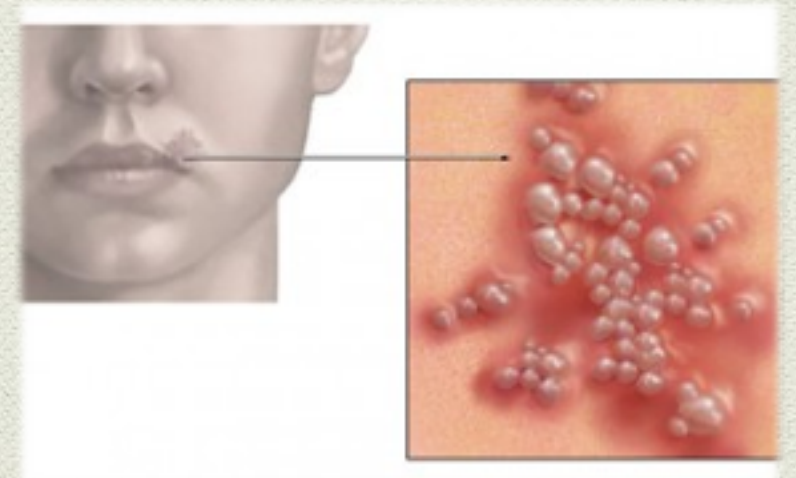


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# Common viral skin infection

- Herpes simplex virus infection (HSV-1 and HSV-2)
- Varicella zoster virus
- Wart (Human papilloma virus)
- Molluscum contagiosum

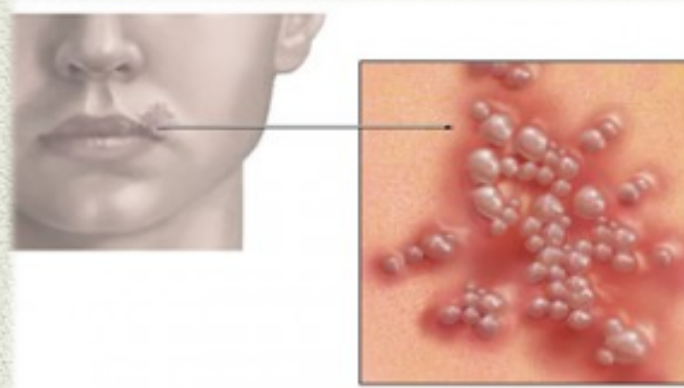




# Herpes simplex infection

## HSV-1

- Primary infection in childhood
- Involving mouths, lips and eyes
- Direct contact with infected oral secretion or skin lesions



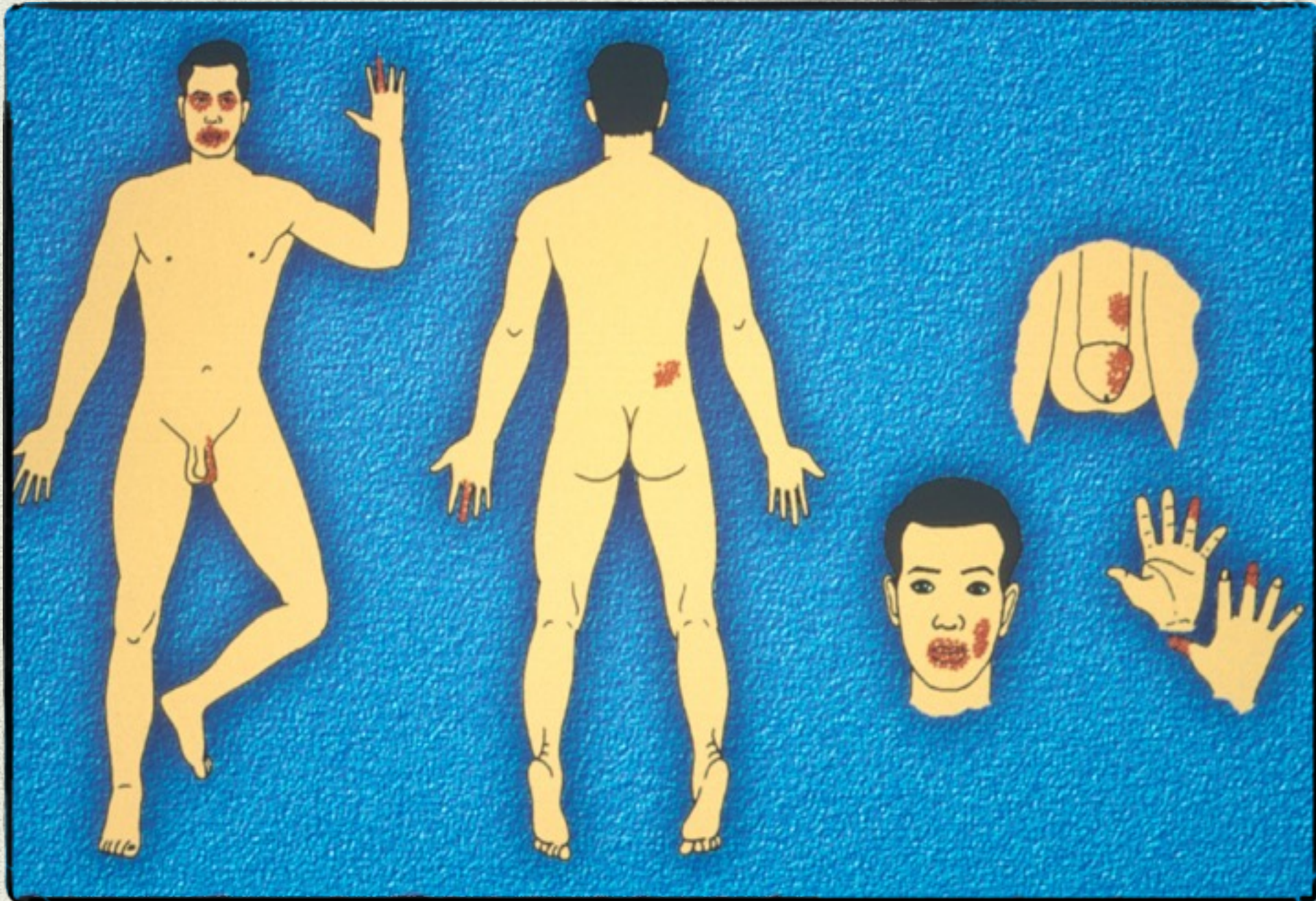
## HSV-2

Commonly acquired via **sexual contact**

-----  
**Sexual abuse should be considered in prepubertal children with genital HSV-2 infection**



# Herpes simplex virus





# Primary herpetic gingivostomatitis





# Primary herpetic gingivostomatitis

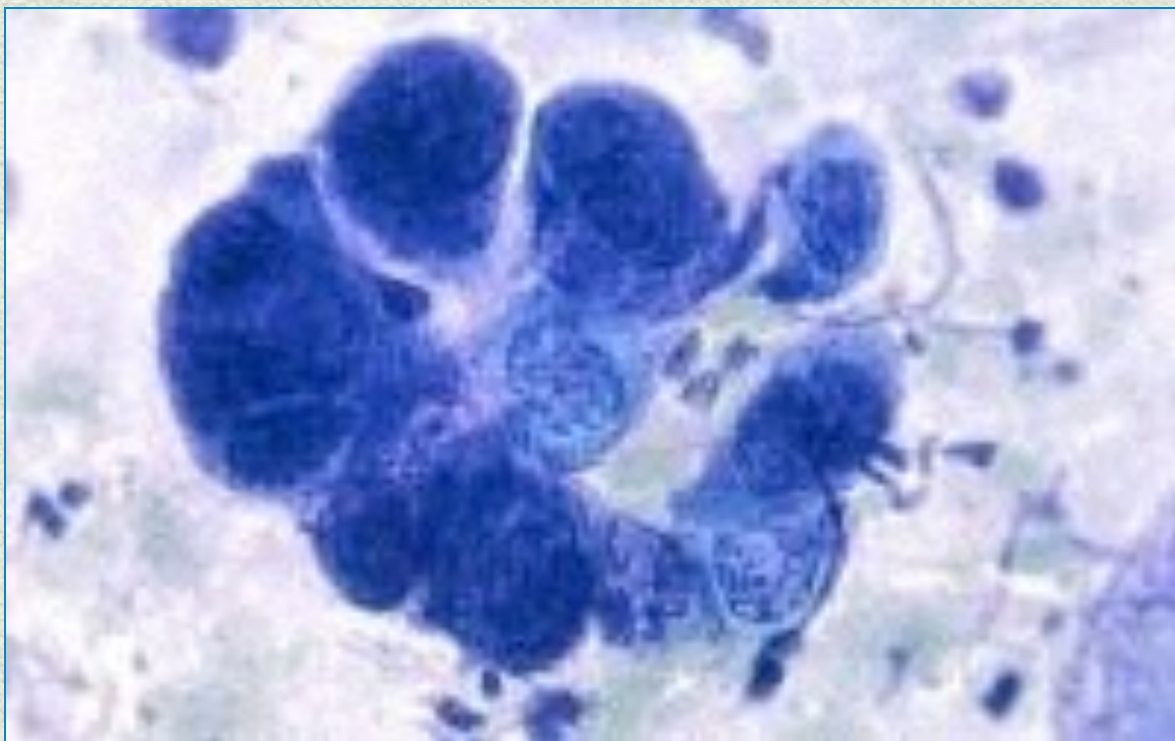
- Often seen in infants and young children
- Clinical
  - ▶ Fever, irritability, refusal to eat and drink, malaise
  - ▶ Erythema, superficial ulcerations and exudative of oral mucosa with perioral cutaneous lesions
- Self-limiting with low morbidity





# Tzanck smear

## Multinucleated giant cell





# Primary herpetic gingivostomatitis

## Treatment

- Supportive
  - ▶ Adequate analgesia, mouth care,
  - ▶ Hospitalize in some cases with dehydration
- Antiviral therapy
  - ▶ Acyclovir 15 mg/kg 5 times a day for 7 days
  - ▶ Shorten duration of symptoms and decrease viral shedding  
*if start early in 24-72 hr*





# Recurrent herpetic lesions

- Reactivation of herpetic infection
  - ▶ Recurrent oral lesion appear often on the vermillion border of the lip
- Most common in the first mo to yr following the primary infection
- Treatment:
  - ▶ Supportive Rx





# Wart

- Etiology: human papilloma virus (HPV)
- Transmission
  - ▶ skin-to-skin contact
  - ▶ contact with contaminated surface





# Wart

- 4 clinical characteristic types:
  - ▶ Common wart (verruccous vulgaris)
  - ▶ Plantar wart (verruccous plantaris)
  - ▶ Flat wart (verruca plana)
  - ▶ Genital wart (condyloma acuminata)
- Sexual abuse should be considered in prepubertal children with genital wart



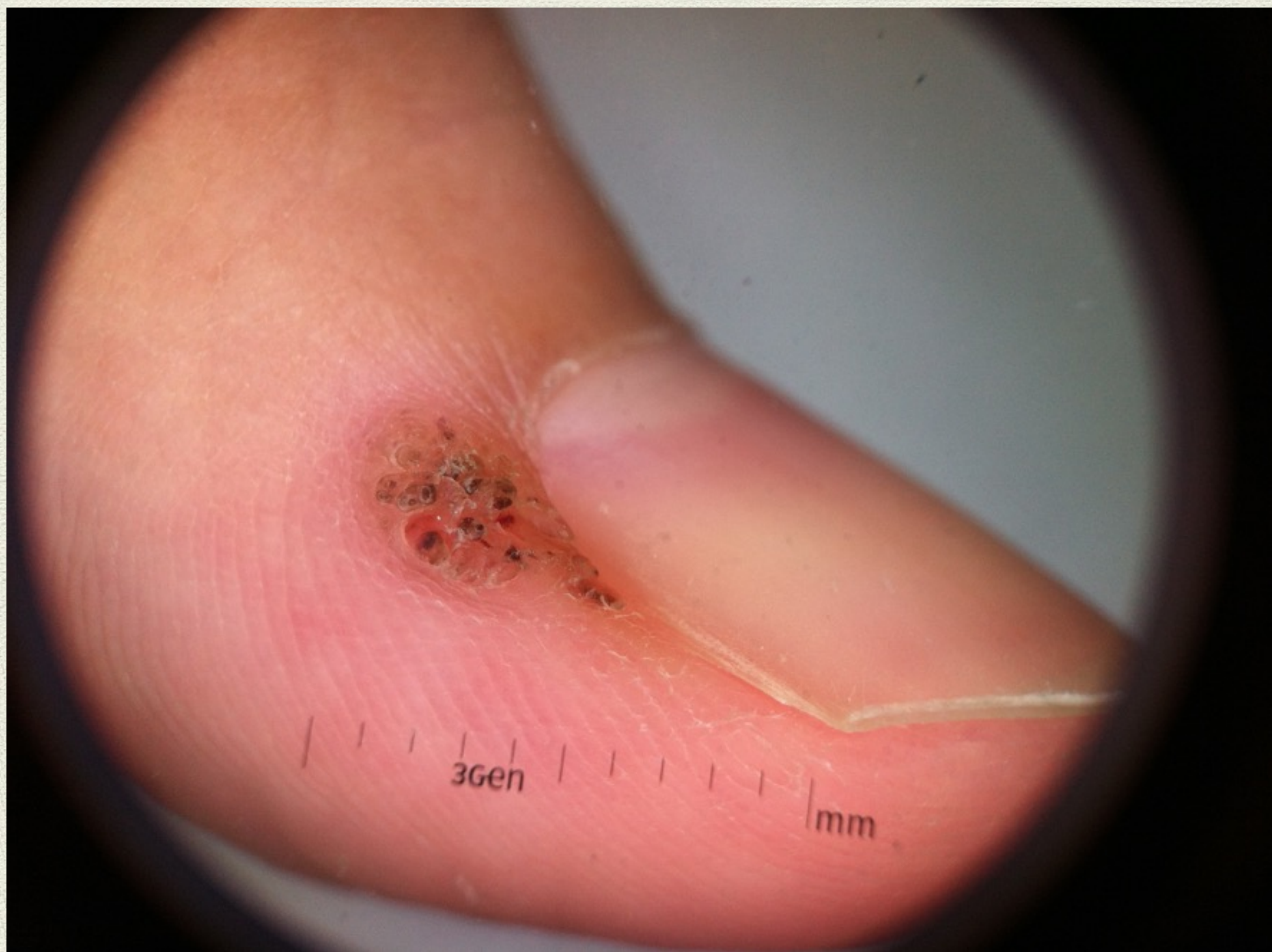














# Wart

## Treatment

- Immunologic: Imiquimod (Aldara)
- Cryotherapy: Liquid nitrogen
- Surgical: Electrodesiccation, Laser, Total excision
- Chemical
  - ▶ Over-the-counter salicylic acids e.g. Duofilm, Collomack
  - ▶ TCA
  - ▶ Retinoic acid
  - ▶ Podophylline



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# Liquid Nitrogen Gun

Treatment of some epidermal diseases;  
Seborrheic keratosis, wart, molluscum contagiosum









# Molluscum contagiosum

- Etiology: human specific pox virus
- Most common 2-5 years
- Person-to-person contact or **autoinoculation**
- Incubation period: 2-6 mo



**dome shaped  
flesh colored papules  
with central umbilication**





**central umbilication**

**central umbilication**



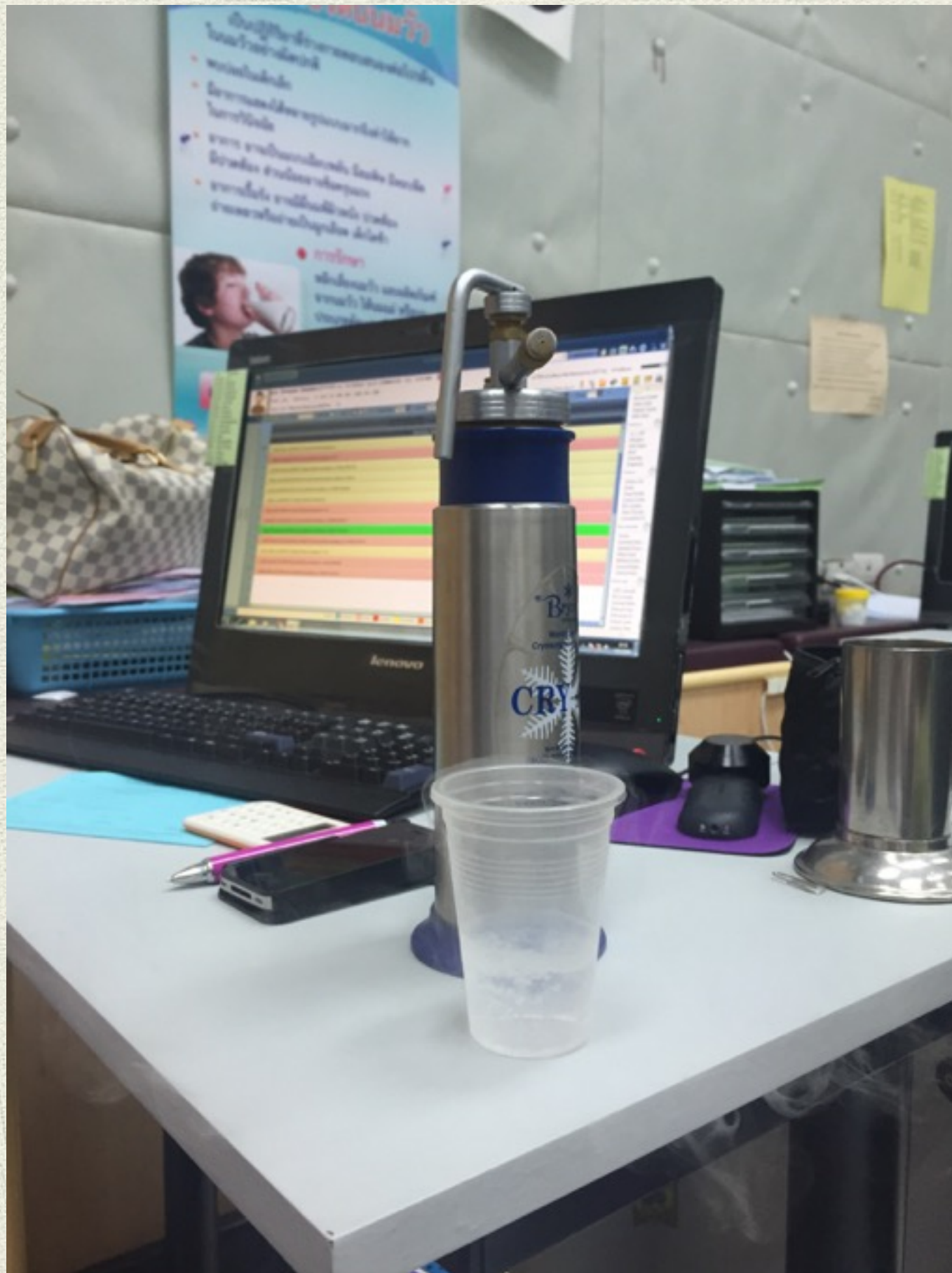
# Molluscum contagiosum

- Self-limited
- Spontaneous resolution within 18 mo of onset
- Treatment:
  - ▶ Mechanical: curettage, laser, cryotherapy
  - ▶ Chemical: TCA, tretinoin (Retin-A)
  - ▶ Immunologic: imiquimod (Aldara)

Aldara







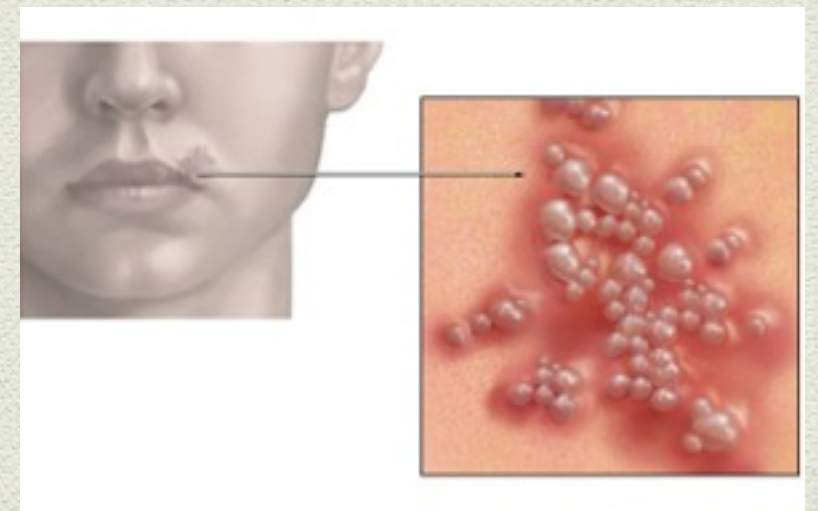






# Common viral skin infection

- Herpes simplex virus infection (HSV-1 and HSV-2)
- Varicella zoster virus
- Wart (Human papilloma virus)
- Molluscum contagiosum





# Superficial fungal infection

- Dermatophytosis
- Pityriasis versicolor
- Candidiasis





# Dermatophytosis

- Infection caused by Trichophyton, Epidermophyton, Microsporum
- Classified into 3 categories  
*based on natural habit and host preference*
  - ▶ **Anthrophillic**: infect only humans
  - ▶ **Geophillic**: reside in soil, infect humans and animals
  - ▶ **Zoophillic**: infect only animals, transmission to humans may occur





# Dermatophytosis

- |                       |                      |
|-----------------------|----------------------|
| <b>Scalp and hair</b> | ▶ <b>T. capitis</b>  |
| <b>Skin – general</b> | ▶ <b>T. corporis</b> |
| <b>Hands</b>          | ▶ <b>T. manuum</b>   |
| <b>Feet</b>           | ▶ <b>T. pedis</b>    |
| <b>Groin</b>          | ▶ <b>T. cruris</b>   |
| <b>Nails</b>          | ▶ <b>T. unguium</b>  |
| <b>Face</b>           | ▶ <b>T. faciei</b>   |
| <b>Beard</b>          | ▶ <b>T. barbae</b>   |





# T. facei





# T. corporis





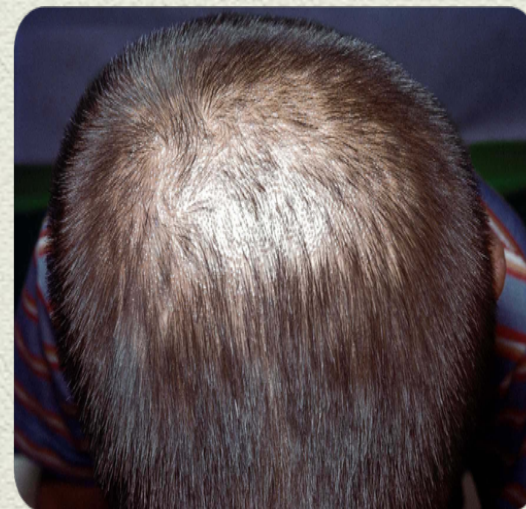
# T. capitis





# T. capitis

- Most cases occur in 4-7 yr
- Uncommon in adults —> antifungal characteristics of sebum
- Clinical
  - Noninflammatory type
    - ▶ Gray-patch ringworm
    - ▶ Blackdot ringworm
  - Inflammatory type
    - ▶ Kerion

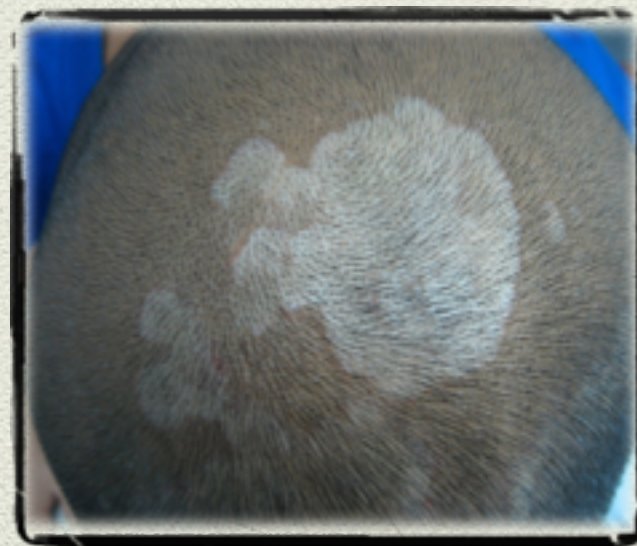


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# T.capitis: noninflammatory type

- Short broken-off hair, patchy hair loss
- Scale is almost always present
- May be pruritus
- Asymptomatic postauricular and occipital adenopathy





# T.capitis: inflammatory type

- Patchy hair loss with scale
- Papules, pustules, erythema, crusting---boggy mass
- Pruritus, swelling, tenderness
- Posterior cervical adenopathy

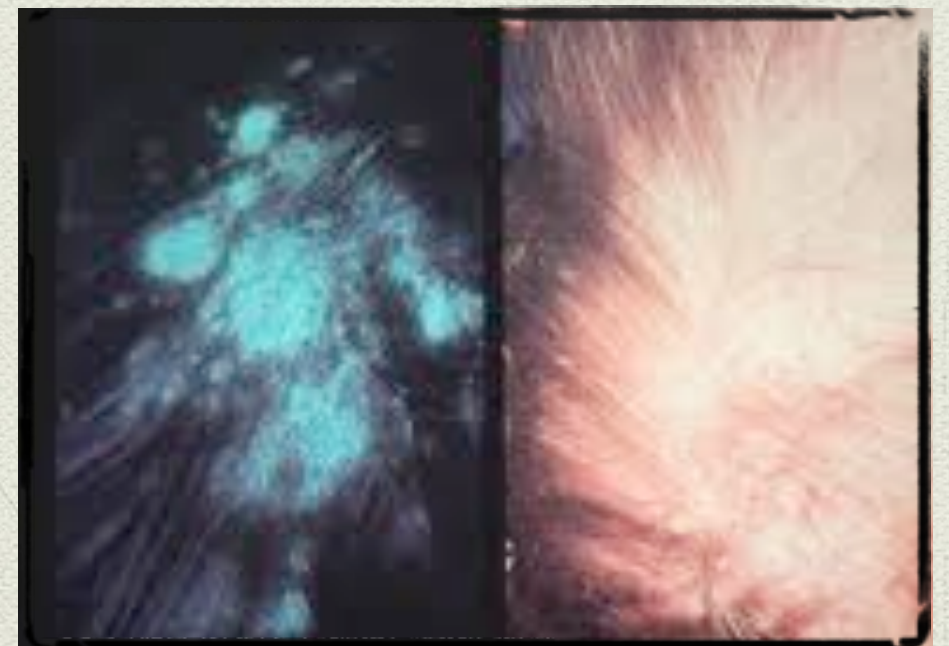




# T.capitis

## Diagnosis

- Clinical symptom
- Wood's lamp in T.capitis : **Blue green- fluorescent** pteridines
- KOH : branching septate hyphae, arthroconidia
- Culture in some cases





# Dermatophyte

## Treatment

### Topical treatment

(body 2-4 wk, scalp & palm & sole 6-8wk)

- ▶ Keratolytic: Whitfield's ointment
- ▶ Tolnafate
- ▶ Undecylinic acid (Desenex)
- ▶ Imidazole: clotrimazole, econazole, ketoconazole, miconazole





# Dermatophyte

## Treatment

### Systemic treatment

- **Griseofulvin**
  - 20-25 mg/kg/day, 6-8 weeks
- Indication
  - ▶ T.capitis, T.unguium
  - ▶ Immunocompromised host





# Dermatophyte

## Treatment

Supportive treatment:

- Hygiene care
- Elimination contagious risk
  - ▶ Systemic treatment
  - ▶ Twice weekly use of a spore-inhibiting shampoo (selenium sulfide, ketoconazole, Zn pyrithione)





# Pityriasis versicolor

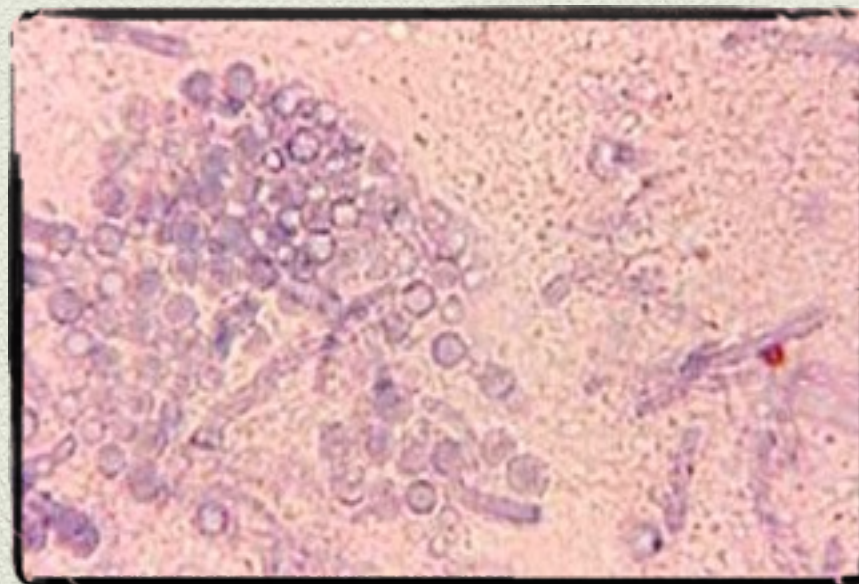
- Caused by *Malassezia*
- Pruritus +/-
- Hypopigmented, faintly scaling ovoid lesion
- Face (forehead & temple), upper back, chest, arm





# Pityriasis versicolor

- Investigation:
  - ▶ Wood's lamp: golden-yellow fluorescence
  - ▶ KOH: budding yeast and short, stubby hyphae **spaghetti and meat ball**
  - ▶ Scotch tape technique





# “versicolor” = vary in color





# Pityriasis versicolor

## Standard treatment:

- ▶ Hygiene care
- ▶ Antifungal shampoo: 15 min OD 2-4 wk
  - 2.5% selenium sulfide shampoo
  - 1-2% zinc pyrithione shampoo
  - 2% ketoconazole shampoo
- ▶ 20% sodium thiosulfate apply 2 times 2-4 wk
- ▶ 40-50% propylene glycol apply 2 times 2-4 wk



# Pityriasis versicolor

## Alternative treatment:

- ▶ Imidazole: clotrimazole, econazole, ketoconazole, miconazole
- ▶ Ketoconazole 3.3-6.6 mg/kg/d or 200 mg/d for 10-14 d

## Prophylaxis treatment

- ▶ Antifungal shampoo wkly
- ▶ Ketoconazole 400 mg monthly or 200 mg/d, 3 d/mo



# Candida infection

- Etiology: *Candida albicans* (mostly)
- Clinical presentation:
  - ▶ Intertriginous and cutaneous candidiasis
  - ▶ Oral candidiasis
    - thrush, leukoplakia
    - angular cheilitis
    - black hair tongue









# Candida infection

## Diagnosis

- KOH: mycelium forms, pseudohyphae and budding yeast

## Treatment

- Oral
  - ▶ Nystatin suspension (100,000 u/ml 4 times/d)
  - ▶ Clotrimazole troche 5 times/d for 7-14 d
  - ▶ Gentian violet: efficacy and potential carcinogenicity
- Cutaneous: eliminate predisposing factor
  - ▶ Topical antifungal cream





# Scabies

- Caused by mite *Sarcoptes scabiei* var *hominis*
- Direct closed contact
- Its entire life cycle within the epidermis of the skin
- May accompany sexual transmitted diseases





# Scabies

- Small red papules and vesicles
- Intense itching particularly at night
- Young children and infants: hands, palms, wrists, buttocks, intergluteal cleft, feet, behind the ears, periumbilical region, skin folds around the neck









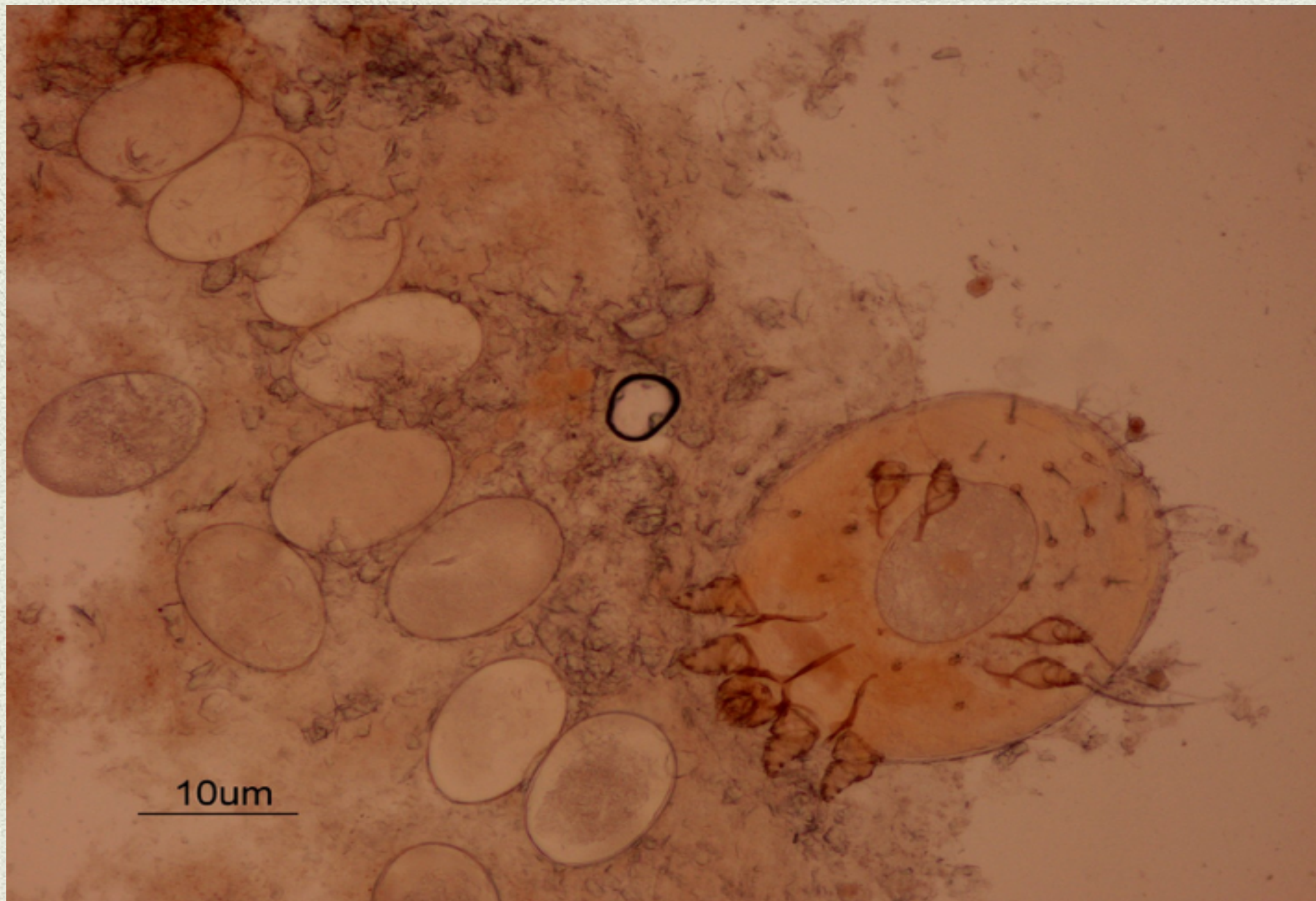
# Scabies

## Diagnosis and treatment

- History and clinical manifestation: close contact
- Demonstration of *S. scabiei* mites, eggs, or scybala is diagnostic
- If burrows present: Burrow ink test
- Therapeutic diagnosis



# Mite and eggs





# Mite, eggs and scybala





# Burrows





# Burrows ink test





# Treatment

**Treatment in all family members to prevent “pingponging infection”**

Therapy	Administration	Cons /risk factors	Pros
Permethrin cream (5%)	Topically overnight on day 1 and day 8	Allergy to formaldehyde	Good but some tolerance noted
Lindane lotion (1%)	Topically overnight, not less than 6 hr or more than 12 hr	CNS side effects, pregnancy	Generic forms inexpensive
Sulfur (5-10%)	Topically for 3 nights	None	Extensive use in young infants and pregnant women





# Treatment

**Treatment in all family members to prevent “pingponging infection”**

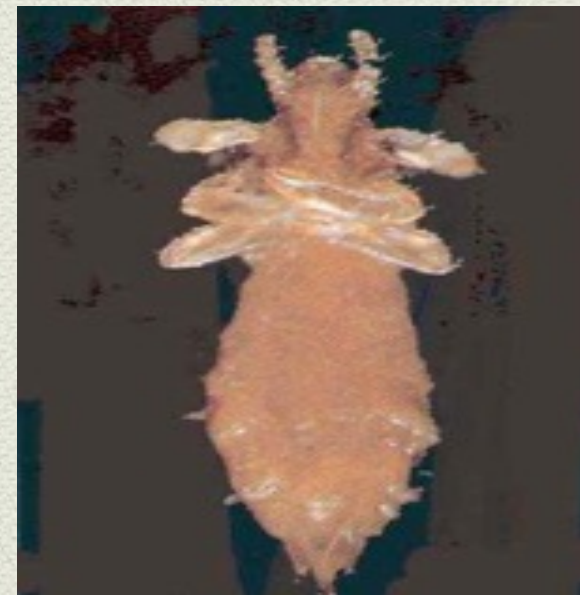
Therapy	Administration	Cons /risk factors	Pros
Crotamiton (10%)	Topically overnight on days 1, 2 and 8	None	Very poor
Benzyl benzoate (10-25%)	3 application of 10% lotion on alternate nights wash off each morning	Stinging, dermatitis, allergic reaction, eye irritation	Excellent
Ivermectin (250-400 µg/kg)	Orally on days 1 & 12 or 14 (250-400 µg/kg)	Avoid if <15 kg, pregnancy	Excellent





# Pediculosis capitis

- *Pediculus humanus var capitis*
- Spread by head-to-head contact as well as fomite transmission
- Classic symptoms
  - ▶ intense pruritus
  - ▶ presence of eggs firmly attached to head hair



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# Pediculosis capitis





Treatment	Administration	Risk	Efficacy
Permethrin (1%, 5%)	10 min topically	None	Fair
Pyrethrins	10 min topically	Allergy to chrysanthemums and related plant	Fair
Malathion (0.5%)	8-12 hr topically	Isopropyl alcohol base is flammable	Excellent
Carbaryl (0.5%)	8-12 hr topically	Cholinesterase inhibitor	Fair
Lindane (1%)	10 min topically	CNS side effects, pregnancy	Poor
Topical ivermectin	10 min topically	None	Appear promising
Oral ivermectin	Oral (250 µg)	Avoid if <15 kg, pregnancy	Very good





# Thank you for your attention

รองศาสตราจารย์ แพทย์หญิง ลีลาวดี เตชาเสถียร

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