Skin and soft tissue infections 3

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Sources :

Harrisons infectious diseases 2nd edition, Oxford Handbook of Infectious Diseases and Microbiology 2nd edition

Hand foot and mouth disease

- Occurs in outbreaks, typically in schools (we had one a few months ago in nov)
- Typically an outbreak denotes presence of optimal conditions for growth and spread…children, schools, winters, large groups of people in small space = outbreak

The typical disease:

- Children under 10 are mostly affected, more-so under 5
- The causative agents are
  - Coxsackie virus A16 (an enterovirus)
  - Enterovirus 71 (HAS BEEN ASSOCIATED WITH ENCEPHALITIS AND MYOCARDITIS)

- Children typically mount a less aggressive immunological response than adults, which maybe beneficial since their immune system is naïve and being exposed for the first time for a large number of new pathogens

→

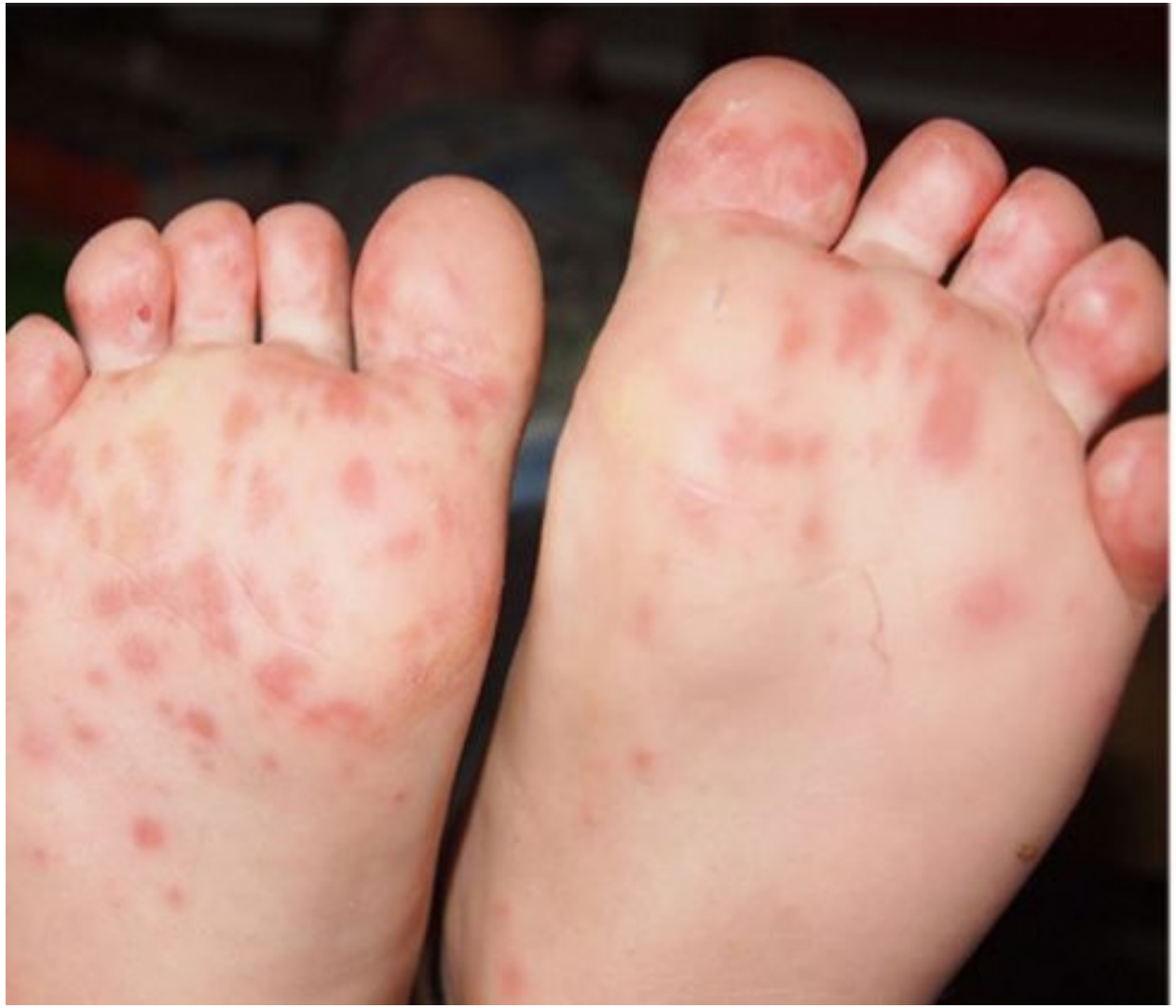
- Atypical disease:
- Higher age groups (adults and teenagers), immune system is more competent and mounts a more aggressive response and this → severe presentation
- Caused by coxsackie A6
- Can have severe presentation with fever, arthralgia and flu like symptoms with the rash as vesicles that affect (the nose, cheeks, extensor arms, elbows, thighs, buttocks, groin)

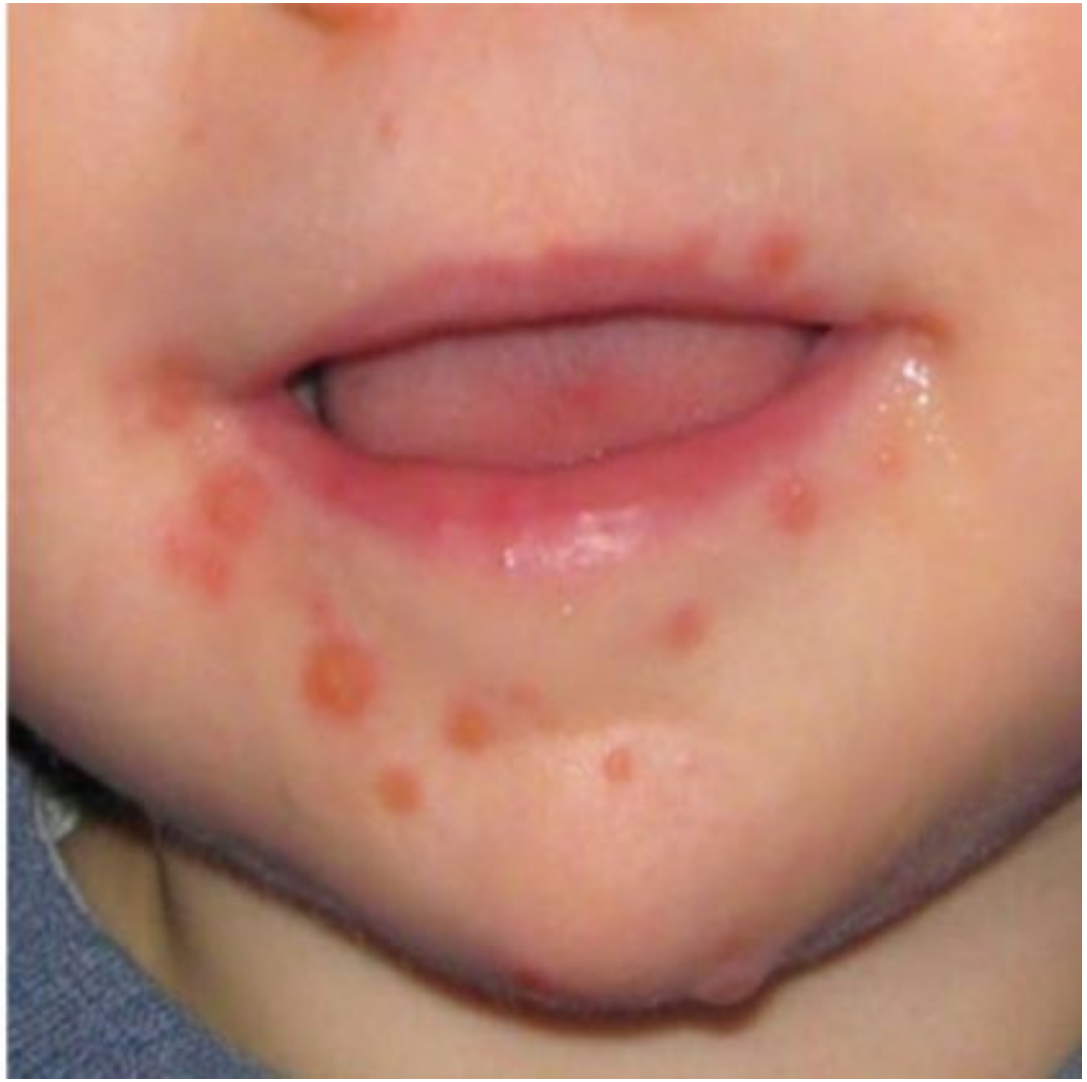
- Both typical and atypical disease are transmitted by **fecooral route, or direct close contact to rash**

Signs and symptoms of HFMD

Symptoms and signs:

- URT symptoms before the skin lesions occur
- With fever, malaise and pharyngitis!
- The rash is typically on the soles and palms and buttocks
- The rash:
- ORAL : football shaped (eye shaped) painful vesicles, involves the buccal mucosa and tongue. (**spares posterior pharynx as opposed to herpangina that spares anterior pharynx)**
- SKIN: red papules that progress to gray vesicles on the soles and palms and buttocks





https://cdn1.dailyhealthpost.com/wp-content/uploads/2016/11/hand-foot-and-mouth-disease-918x420.jpg

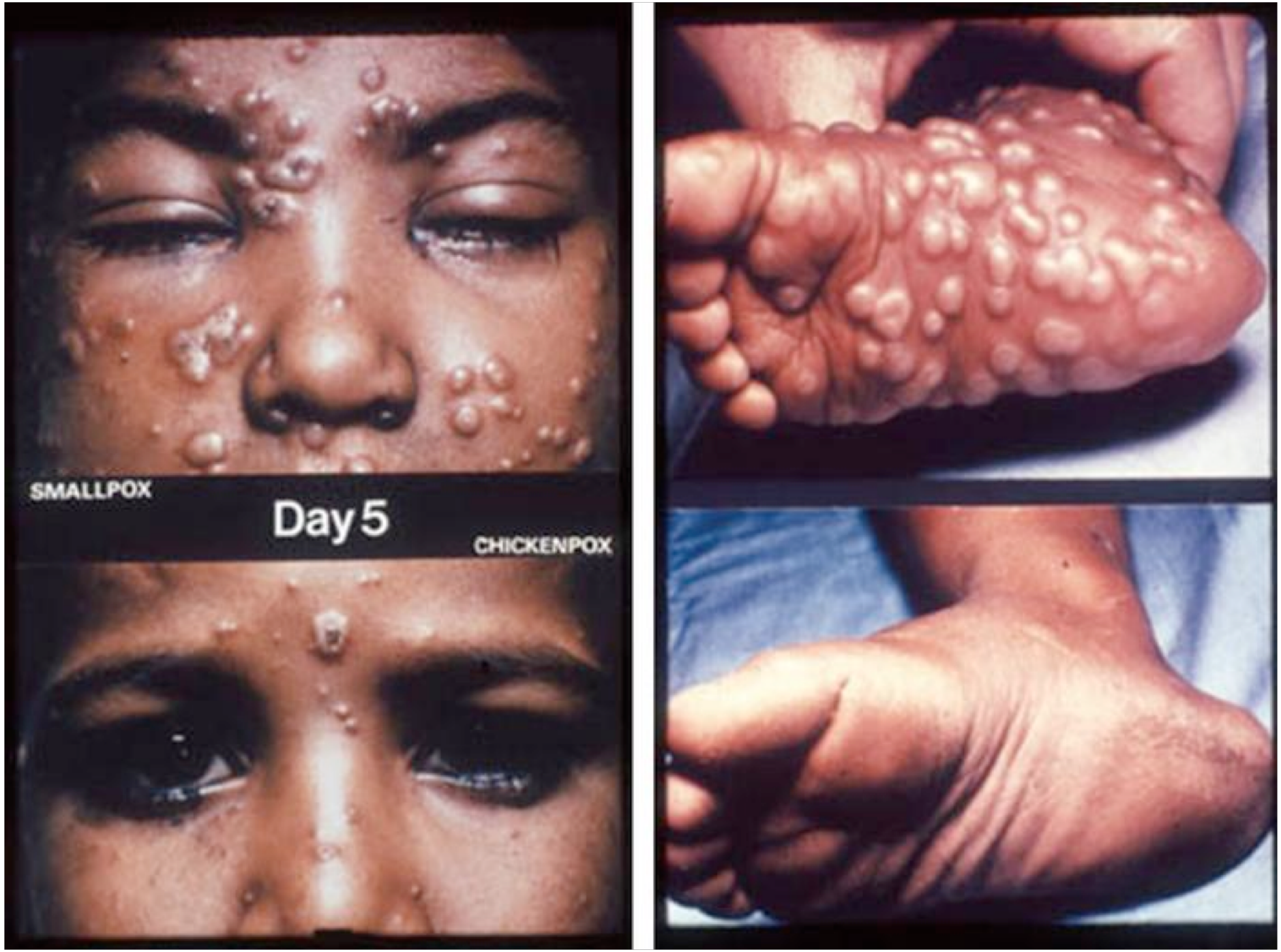
Rx

- Only symptomatic treatment (treat fever, pain)
- Must maintain hydration, this is essential as in all fevers

Consider hospital admission in severe illness (enterovirus A71) which has high morbidity and mortality, as it carries risk of Encephalitis!

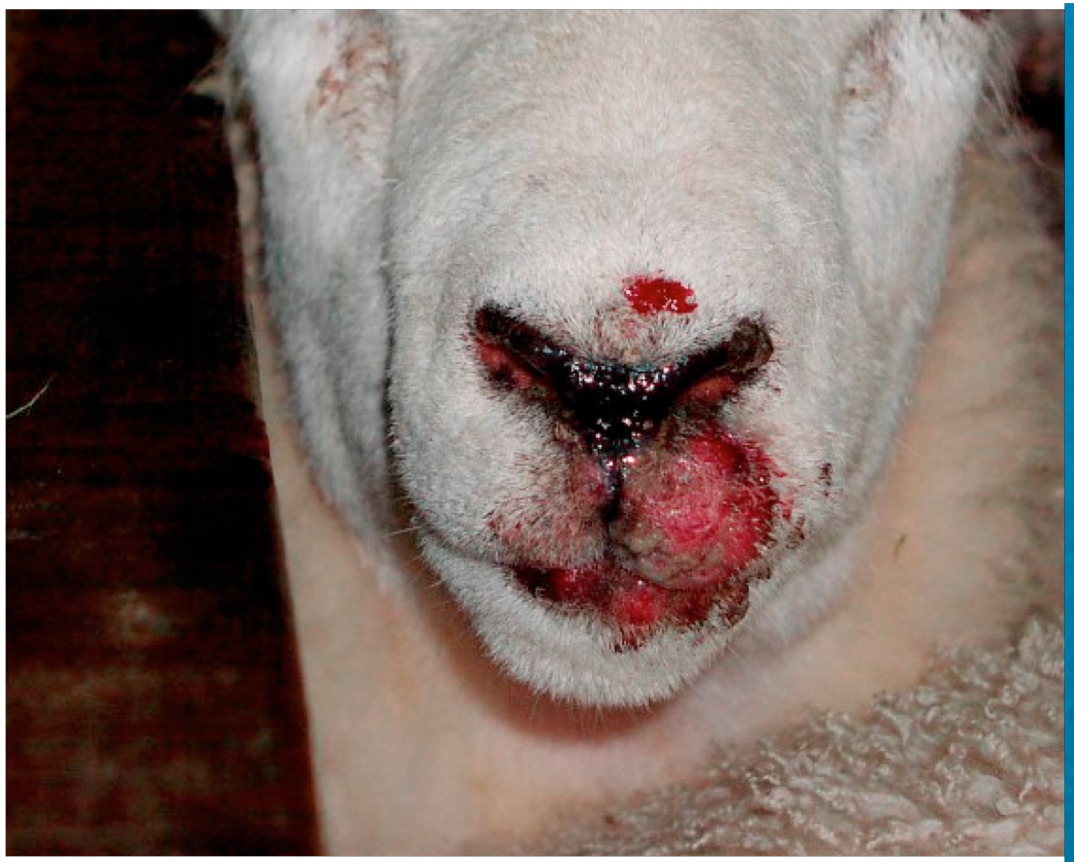
Smallpox

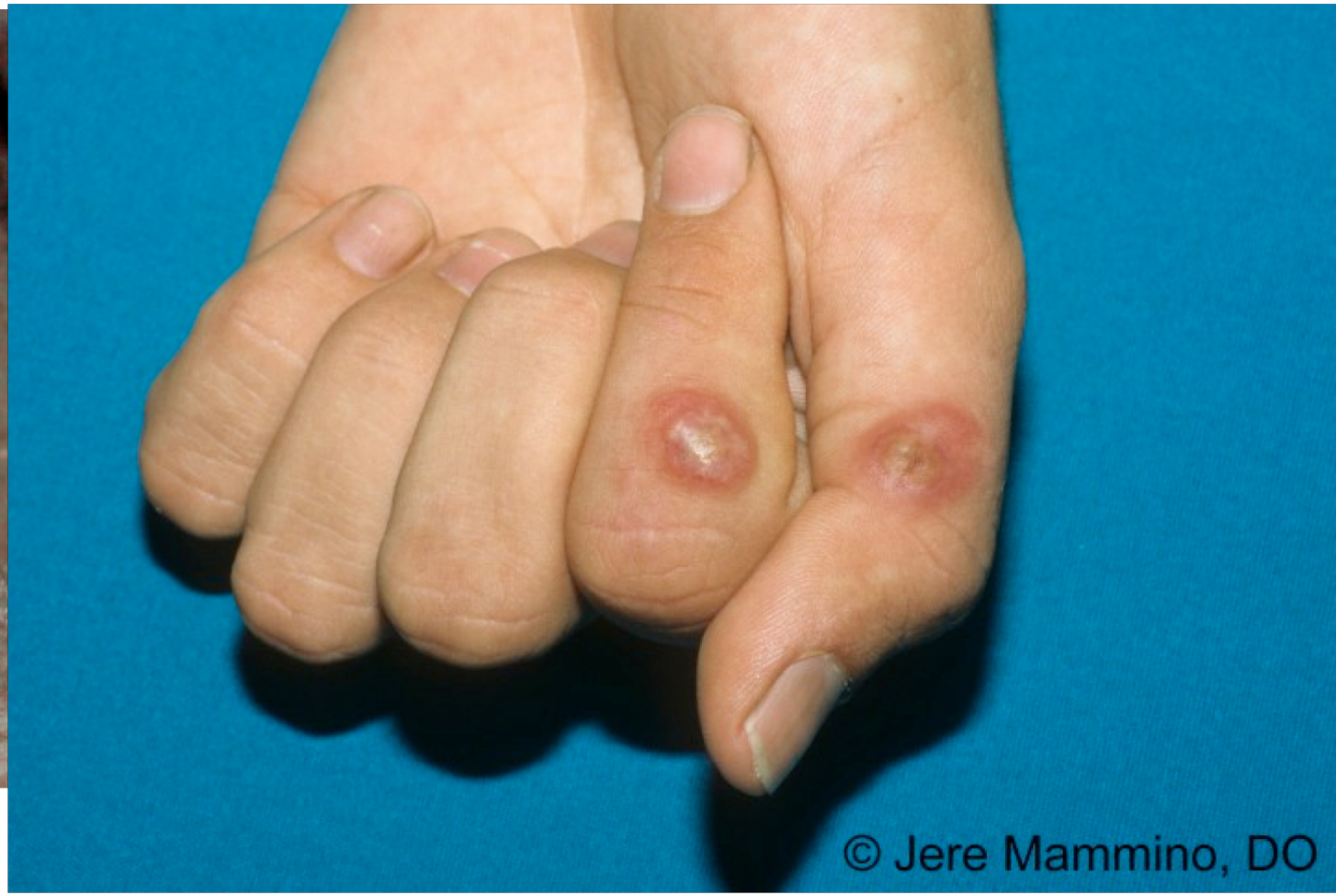
- • Smallpox is caused by variola virus, and orthopoxvirus.
- There are two strains: variola major (mortality 20–50%) and variola minor
- • **The last reported case was in Somalia in 1977, and the virus was declared eradicated by the WHO in 1980.** do not confuse news outlets claims, which are chicken pox outbreaks or measles - (common in anti vaccination groups).
- Virus stocks exist in two laboratories, and there are concerns about its potential use as a bioterrorism agent.
- • The incubation period is 10–12 days and is followed by a prodromal period of 1–2 days.
- The centrifugal rash is initially maculopapular and progresses to vesicles, pustules, and scabs over 1–2 weeks.
- Death may occur with fulminant disease.
- • Diagnosis may be confirmed by EM or PCR (to differentiate it from other poxviruses).
- • There is no specific treatment (supportive)


SMALLPOX
Day 5
CHICKENPOX

Orf

- Orf is caused by a DNA virus related to smallpox virus (parapoxvirus).
- Also called soremouth infection and infects the fingers of individuals who work around goats and sheep.
- Usually transmitted by coming into contact with infected animals (petting, feedings, harnesses,bite) , but can also transmit between people. (animal to human and human to human)
- There is no treatment , however, the papules may become infected by bacteria, or immune compromised → treat with antibacterials
- Can be infected multiple times through out life (each time is less severe).
- Six stages: each about a week
- Small papule→ nodules → ulcerate and crust





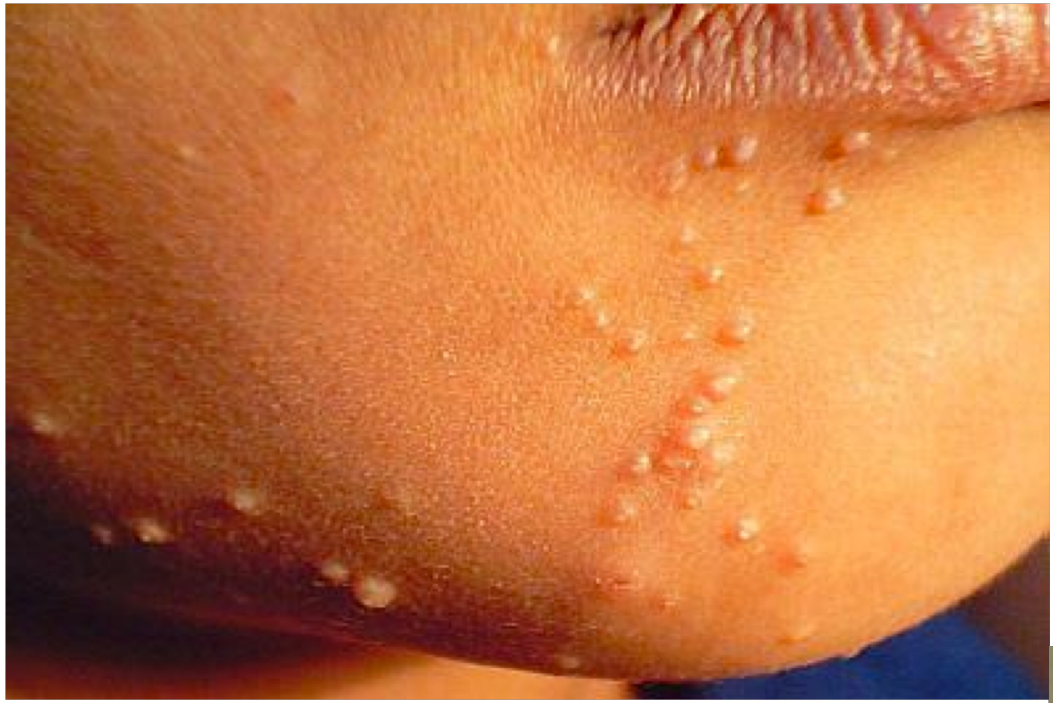
http://www.farmhealthonline.com/wp-content/uploads/2015/09/Orf-MSD-animal-health.co_.uk_.jpg

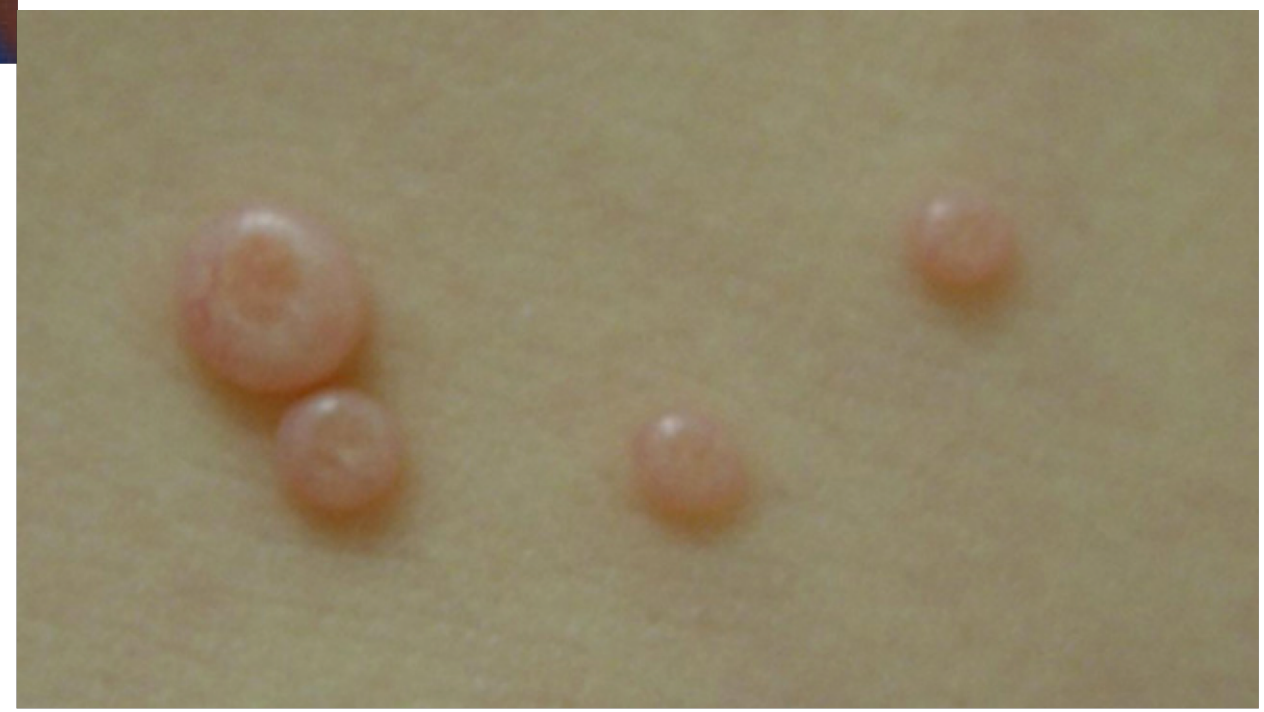
http://c.ymcdn.com/sites/www.aocd.org/resource/resmgr/ddb_high/orf_1_high.jpg

Molluscum contagiosum

- Virus induces flaccid vesicles on the skin of healthy and immunocompromised individuals.
- Mcc 2-11 year olds, in adults as part of STD- transmission by direct contact
- Single or small clusters of vesicles (<30) raised papules, may look like vesicles, **not erythematous!, with central umbilication**
- On face and trunk, pubis and rarely mucosa
- **Resolve on their own** (cryotherapy or other dermatologic treatments can be done) may be present for YEARS
- If associated with HIV → SEVERE
- Complications? Scarring especially if manipulated, bacterial infections, and conjunctivitis for those that are near the eyes.

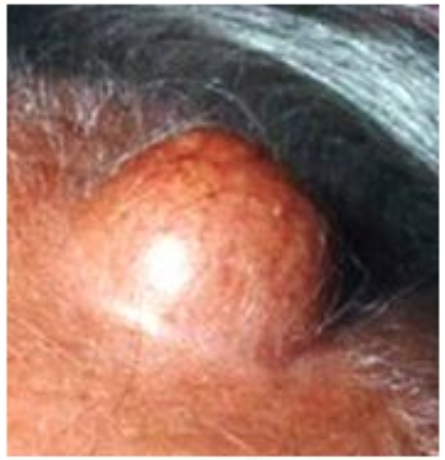
https://www.healthline.com/hlcmsresource/images/galleries/Molluscum-Contagiosum/molluscum_contagiosum_adult_stomach.jpg



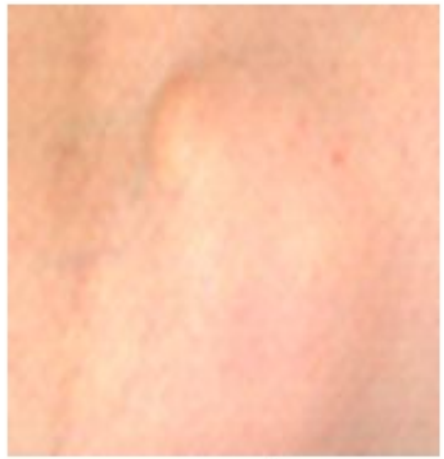


Definitions of infective skin lesions

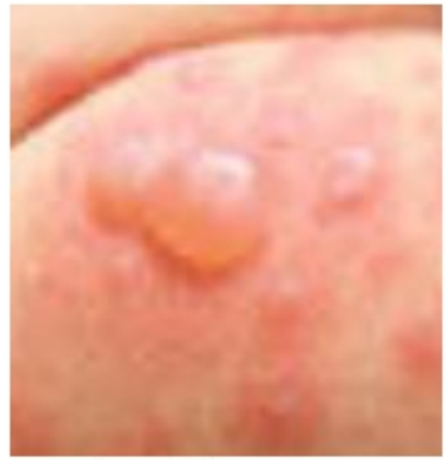
- Macules: are lesions that **have change in colour,** but not elevated or depressed from the rest of the skin surface They measure less than 10mm in diameter.
- Papules: are **elevated** lesions which are less than 10mm in diameter.
- Vesicles: are **small** fluid filled lesions, typically associated with viral infections.
- Bullae: are **large fluid** filled lesions.
- **Crusted lesions : bullae that do not remain closed for long, fluid released crusts over/or lesion that crust during the course of infection.**
- Ulcers: are a loss of the layers of the skin (or mucous membranes) which fails to heal.
- Petechiae : a small red or purple spot caused by bleeding into the skin.
- Purpura: a rash of purple spots on the skin caused by internal bleeding from small blood vessels (can think of it as a collection of petechiae).
- Eschar: a dry, dark scab or falling away of dead skin, typically caused by a burn, an insect bite, or infection with anthrax.



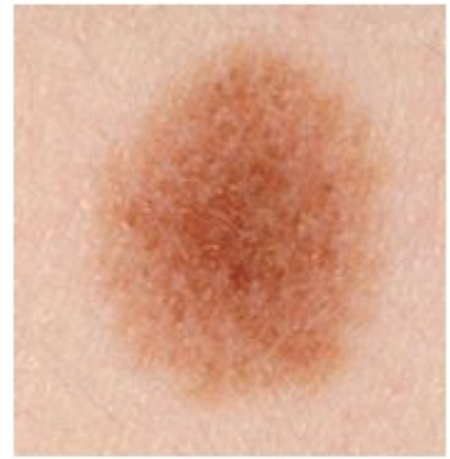
nodule



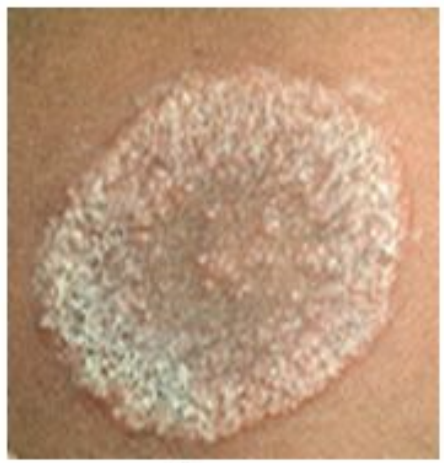
cyst



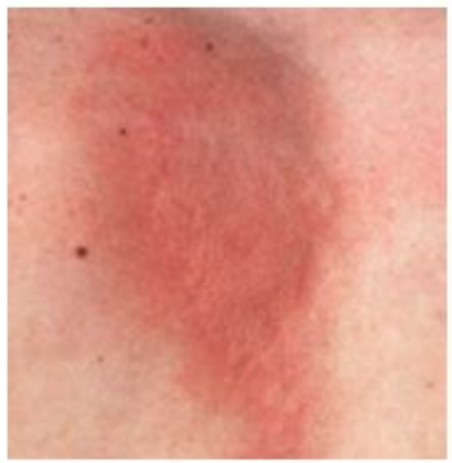
bullae



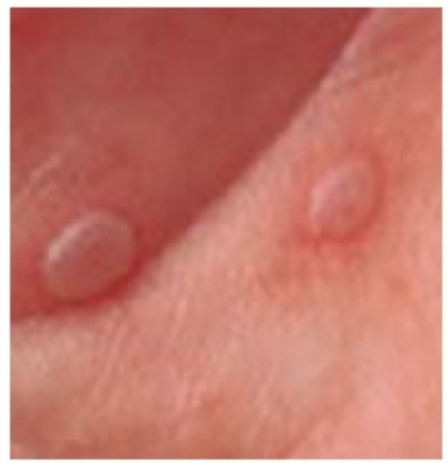
macule



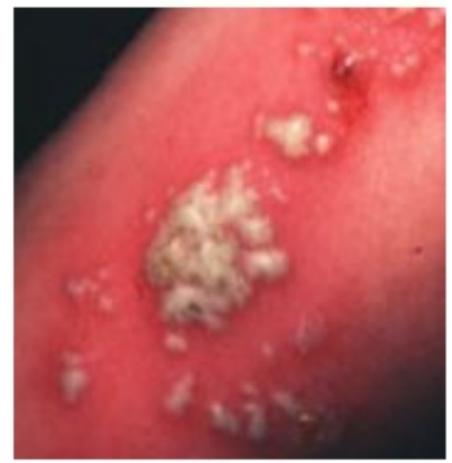
plaque



wheal



vesicle



pustule

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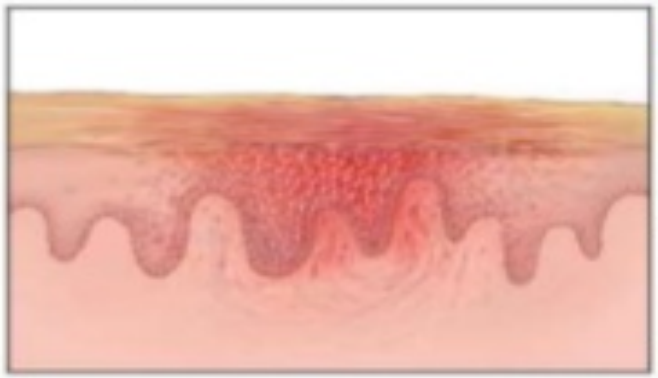
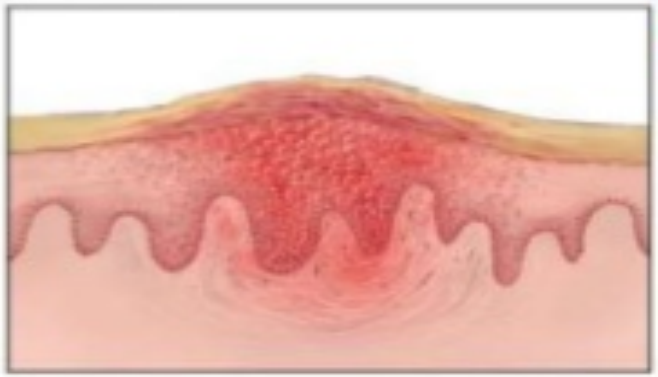
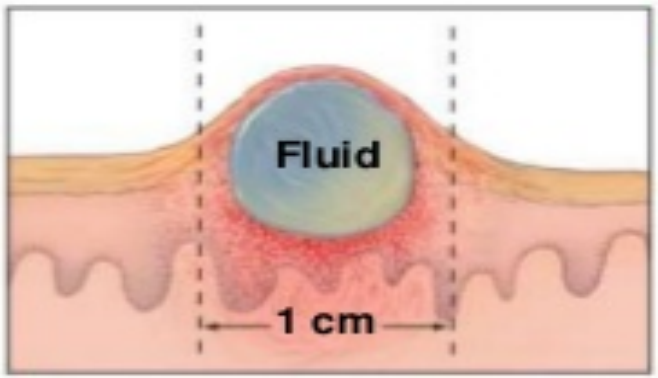


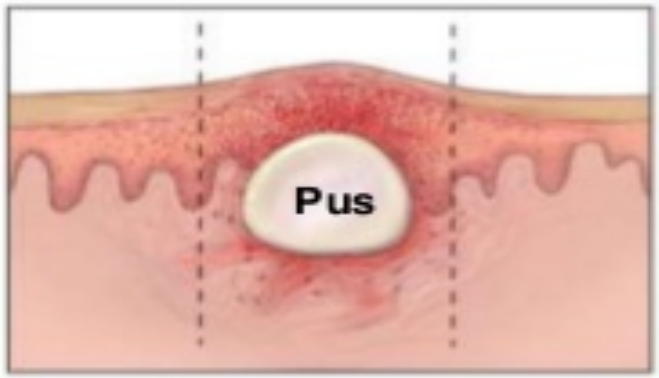
1 Macule



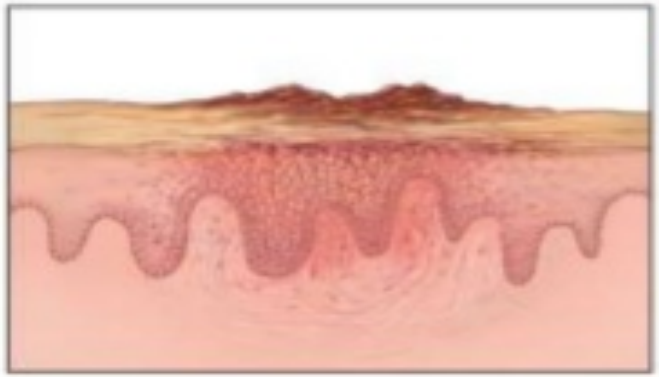
2 Papule



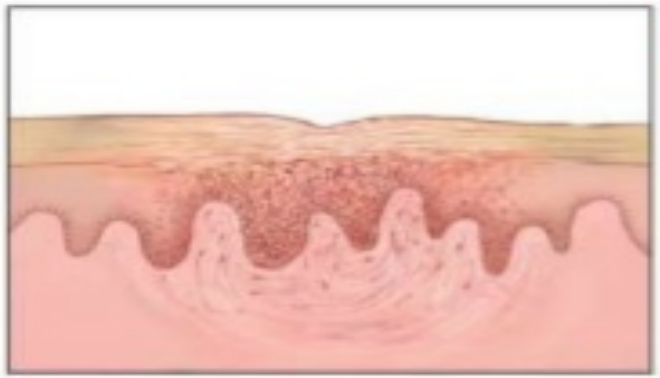
3 Vesicle



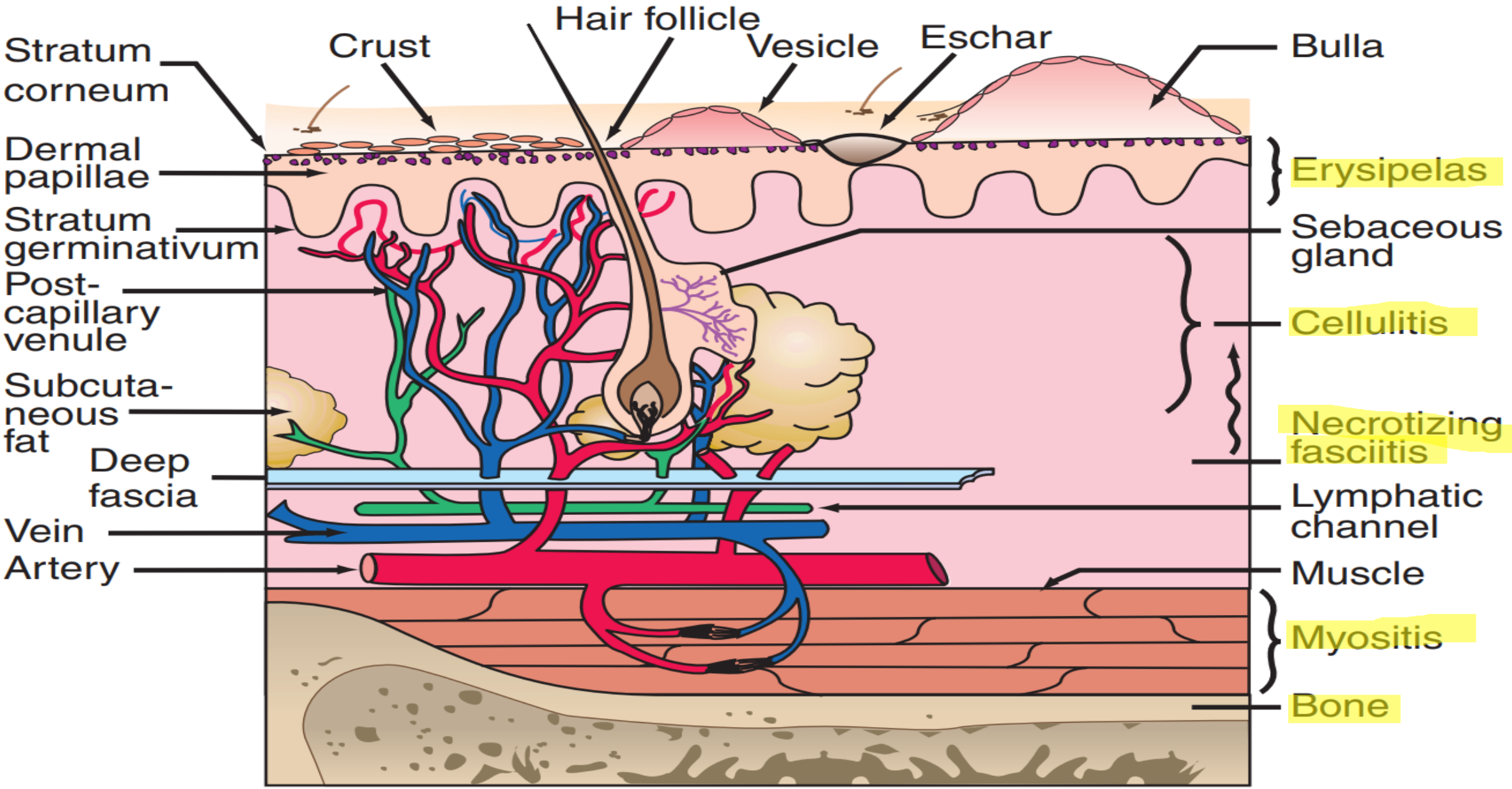
4 Pustule



5 Crust



6 Scar


Stratum corneum
Crust
Hair follicle
Vesicle
Eschar
Bulla
Dermal papillae
Stratum germinativum
Post-capillary venule
Subcuta-neous fat
Deep fascia
Vein
Artery
Erysipelas
Sebaceous gland
Cellulitis
Necrotizing fasciitis
Lymphatic channel
Muscle
Myositis
Bone

Infections Associated with Crusted Lesions

Crusted lesions	
Bullous impetigo/ecthyma	*S. aureus*
Impetigo contagiosa	*S. pyogenes*
Ringworm	Superficial dermatophyte fungi
Sporotrichosis	*Sporothrix schenckii*
Histoplasmosis	*Histoplasma capsulatum*
Coccidioidomycosis	*Coccidioides immitis*
Blastomycosis	*Blastomyces dermatitidis*
Cutaneous leishmaniasis	*Leishmania* spp.
Cutaneous tuberculosis	*Mycobacterium tuberculosis*
Nocardiosis	*Nocardia asteroides*

Impetigo •

- Caused by *S. aureus and/or GAS* →usual skin flora, with local trauma that allows colonizing bacteria to break through.
- Commonly affects children (2-5 years) in tropical/subtropical regions; also prevalent in temperate regions in summer months (warm weather >).
- It is the most common bacterial skin infection in children
- 70% are non bullous and appear as crusted legions
- It is highly contagious (scratching, towels, clothing, autoinfection and spread in daycares)

Clinical features—occurs on the face and extremities.

- Lesions start as small macule or papule → small vesicles (with erythema) →develop into **flaccid bullae** → rupture, releasing a yellow discharge which forms thick crusts.
- Usually seen with regional LAP
- Can cause cellulitis (deeper infection, see later)
- Or PSGN (post strep GN)
- • Treatment— Topical agents for most cases → mupirocin is the best topical agent.

Patients who have numerous lesions or who do not respond to topical treatment should receive o**ral antibiotics (flucloxacillin or cefalexin)**.

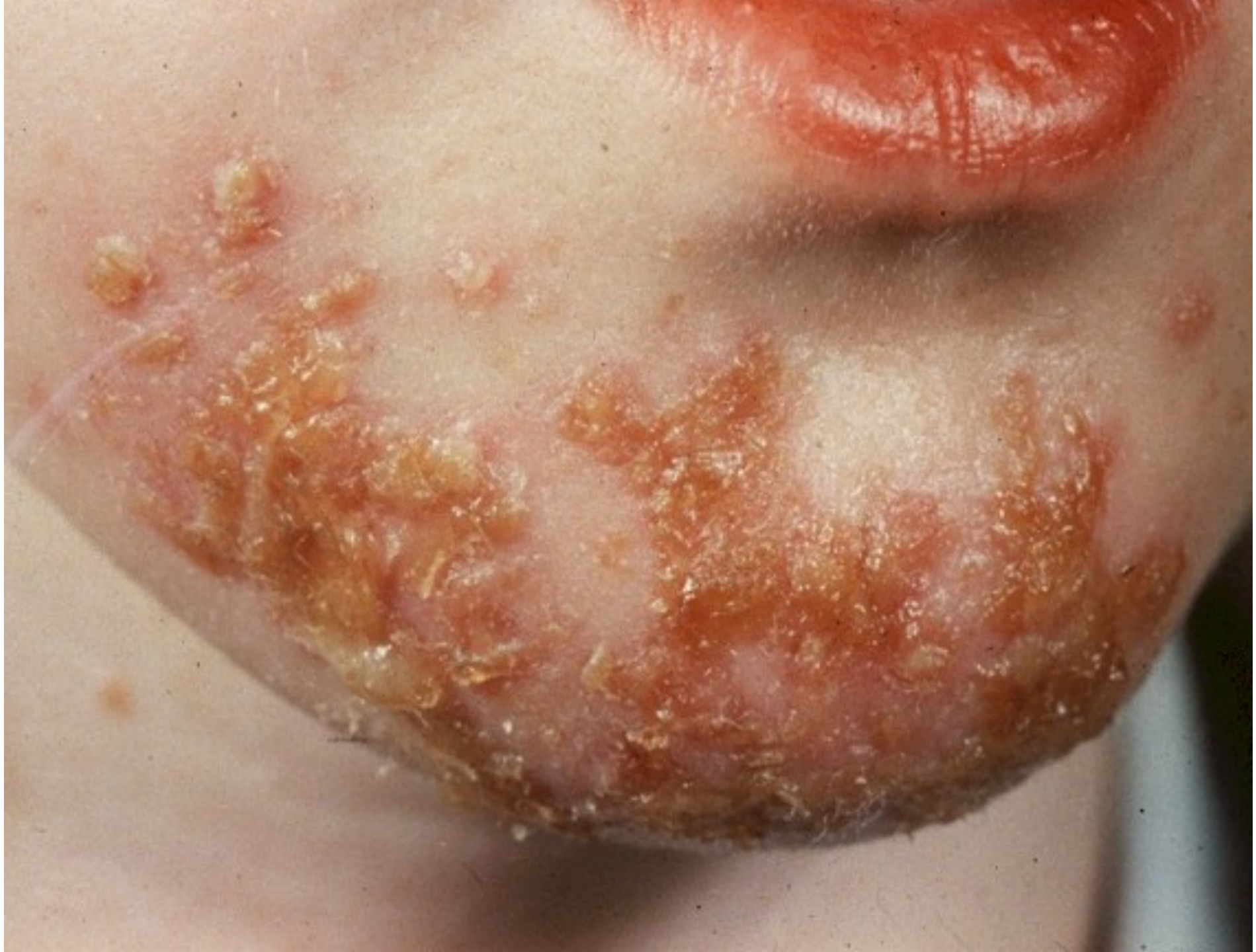
If MRSA is suspected/isolated, then treatment with doxycycline, clindamycin, or co-trimoxazole.

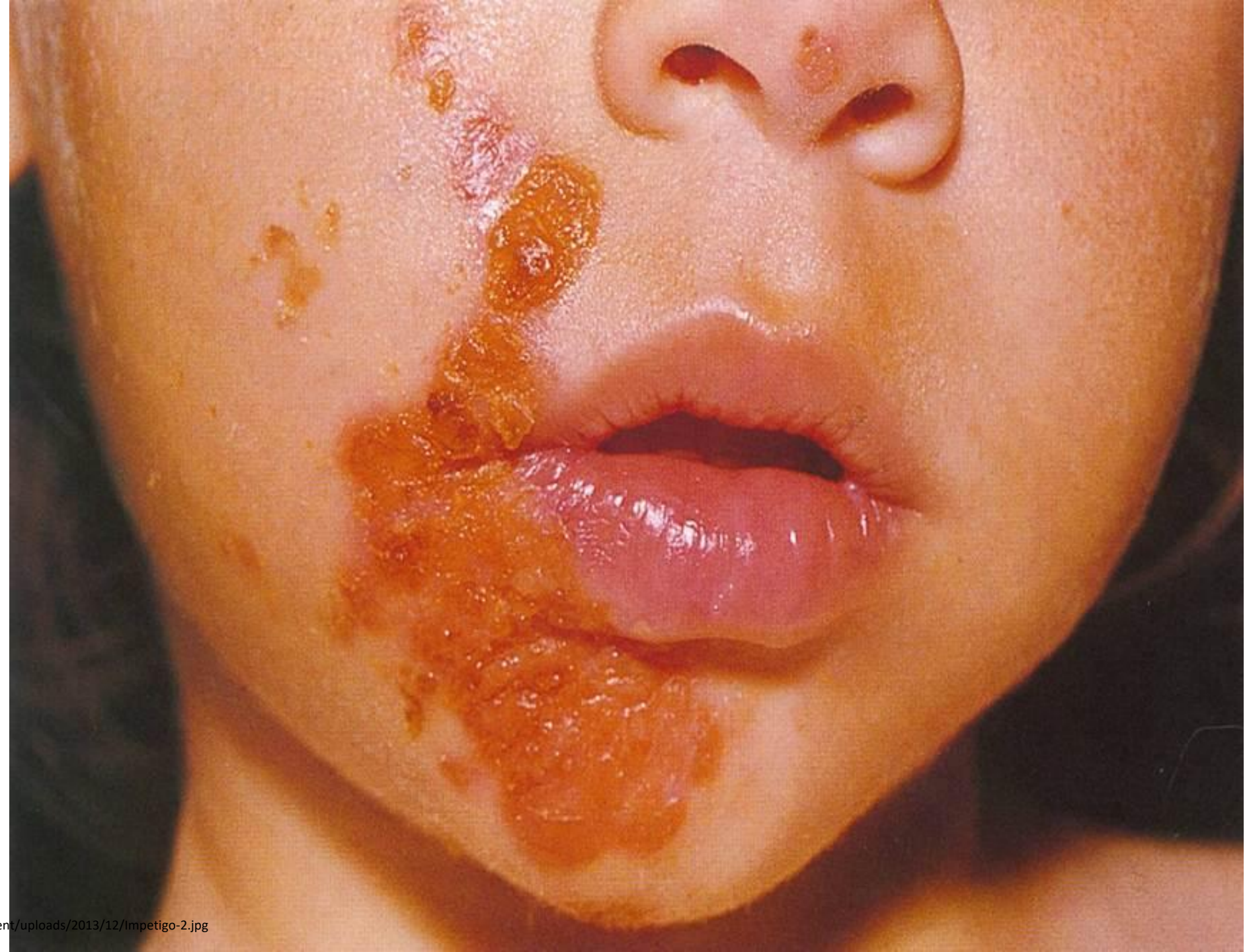
Organism	Type of Pathogenesis	Typical Disease	Predisposing Factor	Mode of Prevention
S. aureus	1. Toxigenic (superantigen)	Toxic shock syndrome	Vaginal or nasal tampons	Reduce time of tampon use
		Food poisoning	Improper food storage	Refrigerate food
	2. Pyogenic (abscess)			
	a. Local	Skin infection (e.g., impetigo, surgical-wound infections)	Poor skin hygiene; failure to follow aseptic procedures	Cleanliness; handwashing; reduce nasal carriage
	b. Disseminated	Sepsis, endocarditis[1]	IV drug use	Reduce IV drug use
S. epidermidis	Pyogenic	Infections of intravenous catheter sites and prosthetic devices	Failure to follow aseptic procedures or remove IV catheters promptly	Handwashing; remove IV catheters promptly
S. saprophyticus	Pyogenic	Urinary tract infection	Sexual activity	

IV = intravenous.

[1]For simplicity, many forms of disseminated diseases caused by *S. aureus* (e.g., osteomyelitis, arthritis) were not included in the table.

Organism	Type of Pathogenesis	Typical Disease	Main Site of Disease (D), Colonization (C), or Normal Flora (NF)
S. pyogenes (group A)	1. Pyogenic		
	a. Local	Impetigo, cellulitis	Skin (D)
		Pharyngitis	Throat (D)
	b. Disseminated	Sepsis	Bloodstream (D)
	2. Toxigenic	Scarlet fever	Skin (D)
		Toxic shock	Many organs (D)
	3. Immune-mediated (poststreptococcal, nonsuppurative)	Rheumatic fever	Heart, joints (D)
		Acute glomerulonephritis	Kidney (D)
S. agalactiae (group B)	Pyogenic	Neonatal sepsis and meningitis	Vagina (C)
E. faecalis (group D)	Pyogenic	Urinary tract infection, endocarditis	Colon (NF)
S. bovis (group D)	Pyogenic	Endocarditis	Colon (NF)
S. pneumoniae	Pyogenic	Pneumonia, otitis media, meningitis	Oropharynx (C)
Viridans streptococci	Pyogenic	Endocarditis	Oropharynx (NF)

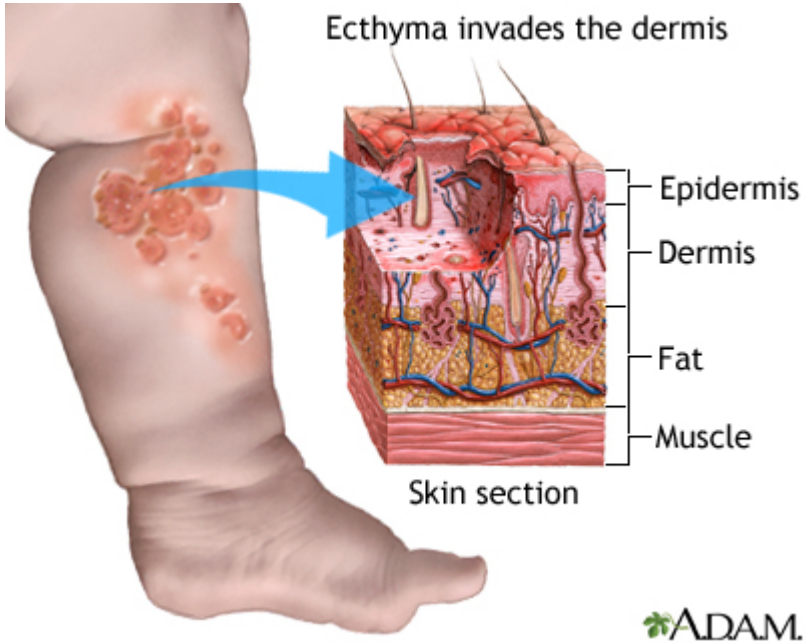


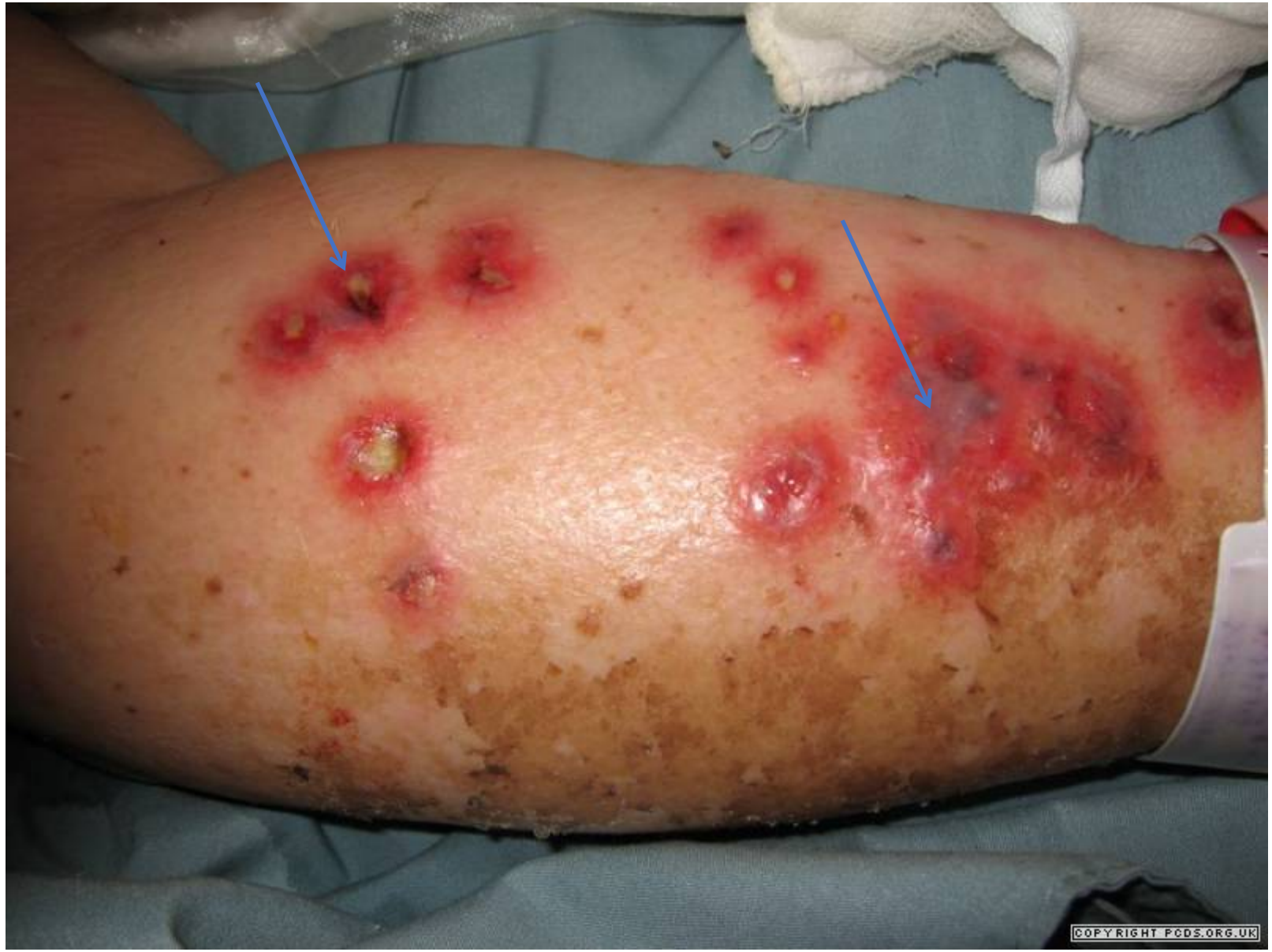


http://diseasespictures.com/wp-content/uploads/2013/12/Impetigo-2.jpg

Ecthyma

- • Punched-out ulcers surrounded by raised deep red/violet margins → invades into the dermis and leaves highly inflamed regions on the sides
- • Caused by *S. aureus or GAS*. Other similar lesions (ecthyma gangrenosum) may occur with *P. aeruginosa* in neutropenic (reduced neutrophils in blood) patients.
- Difference from impetigo? This is the deeper form of impetigo (can progress into or start as Ecthyma)
- • Empiric treatment is with *flucloxacillin* or *cephalexin* (unless cultures yield streptococci alone, in which case penicillin is appropriate). Notice in the deeper form, topical treatment isn't used
- Antipseudomonal agents, e.g. piperacillin-tazobactam, should be given for *P. aeruginosa* infections.





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Dermatophytes

- A group of fungi (more than one), the connection between this is that they are →capable of invading and feeding off of the dead keratin of skin, hair, and nails (require keratin for their growth).
- They are spread by direct contact with patients(human to human) or animals or soil (environment).
- Clinical classification is by **age group**:

Children :

-tinea capitis (scalp hair and the commonest in children),

-tinea corporis (trunk and limbs)

-tinea faciale (face)

cont.

Adolescents:

-tinea manuum and pedis (palms and soles – athletes foot-, and the commonest overall worldwide)

-tinea unguium (nail—also known as onychomycosis)

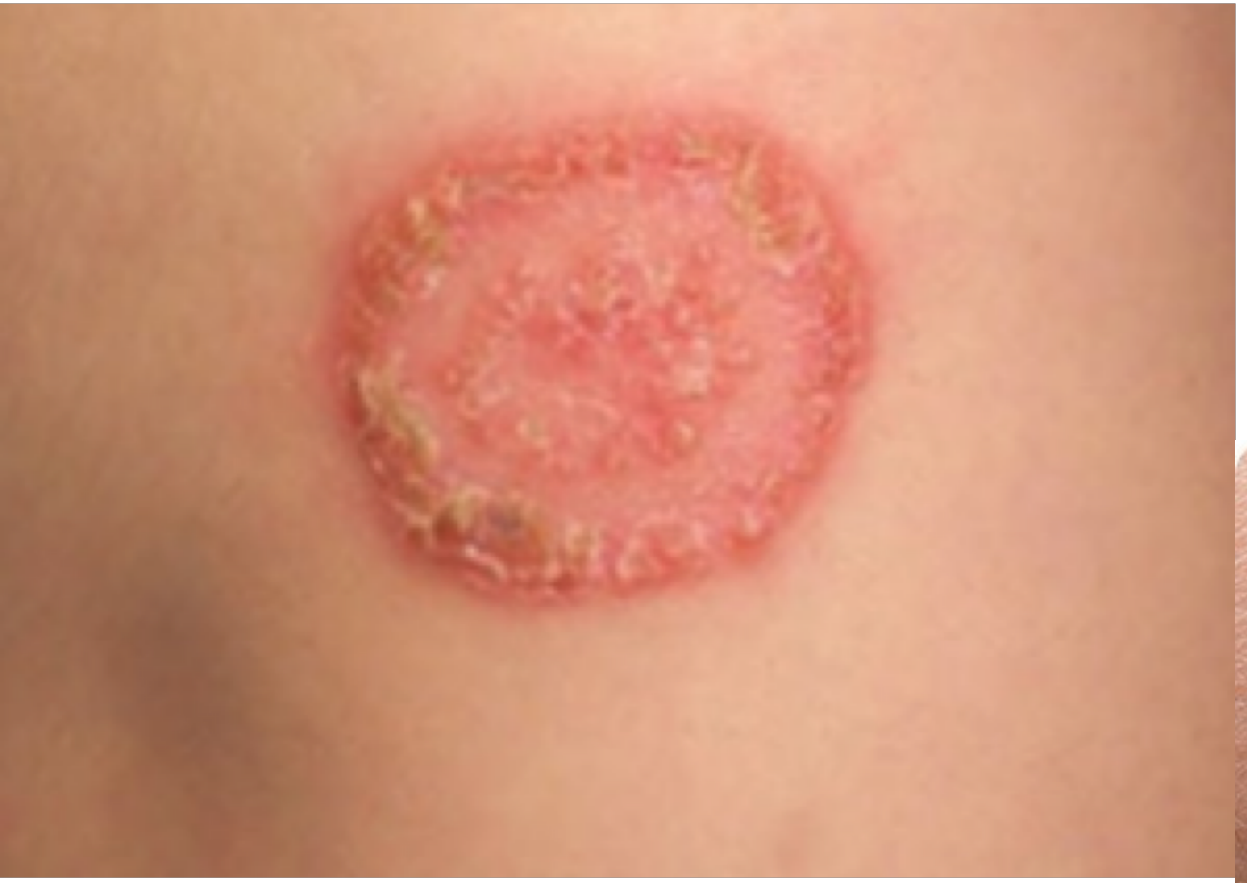
Adults:

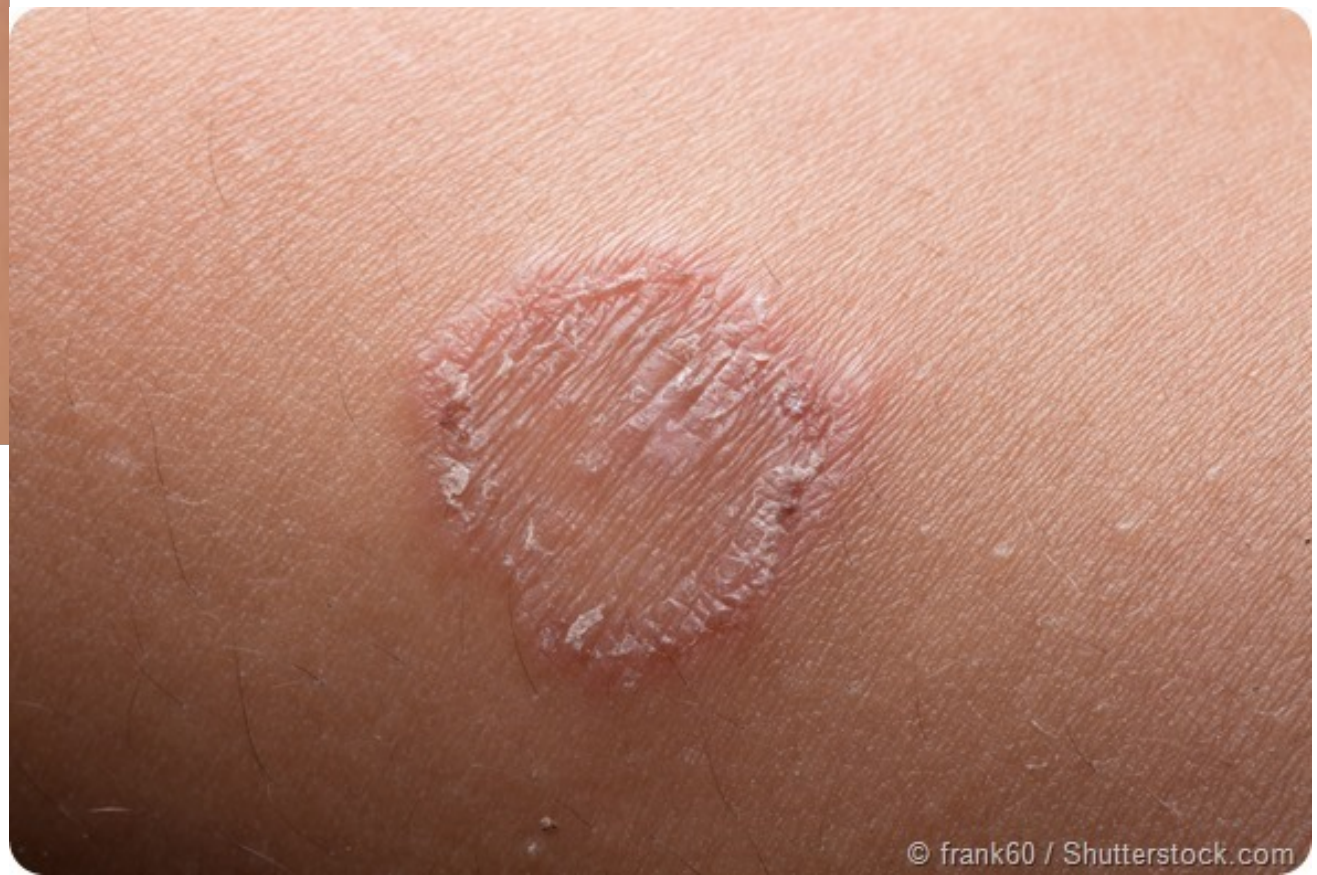
-tinea cruris (groin) AKA jock itch

-tinea barbae (beard area and neck)

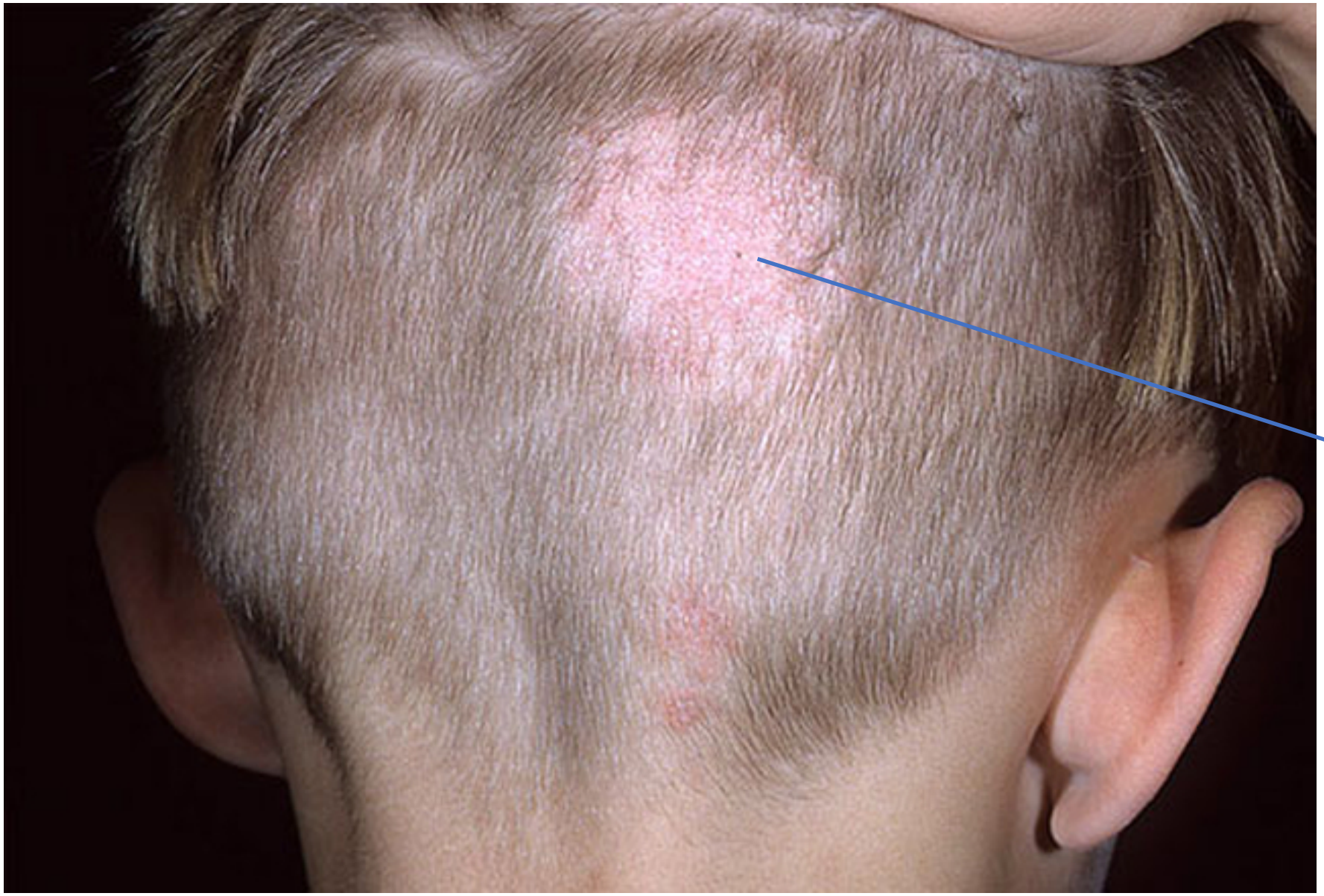
-Tinea corporis Gladiatorum (wrestlers)

Ringworm, corporis, circinata



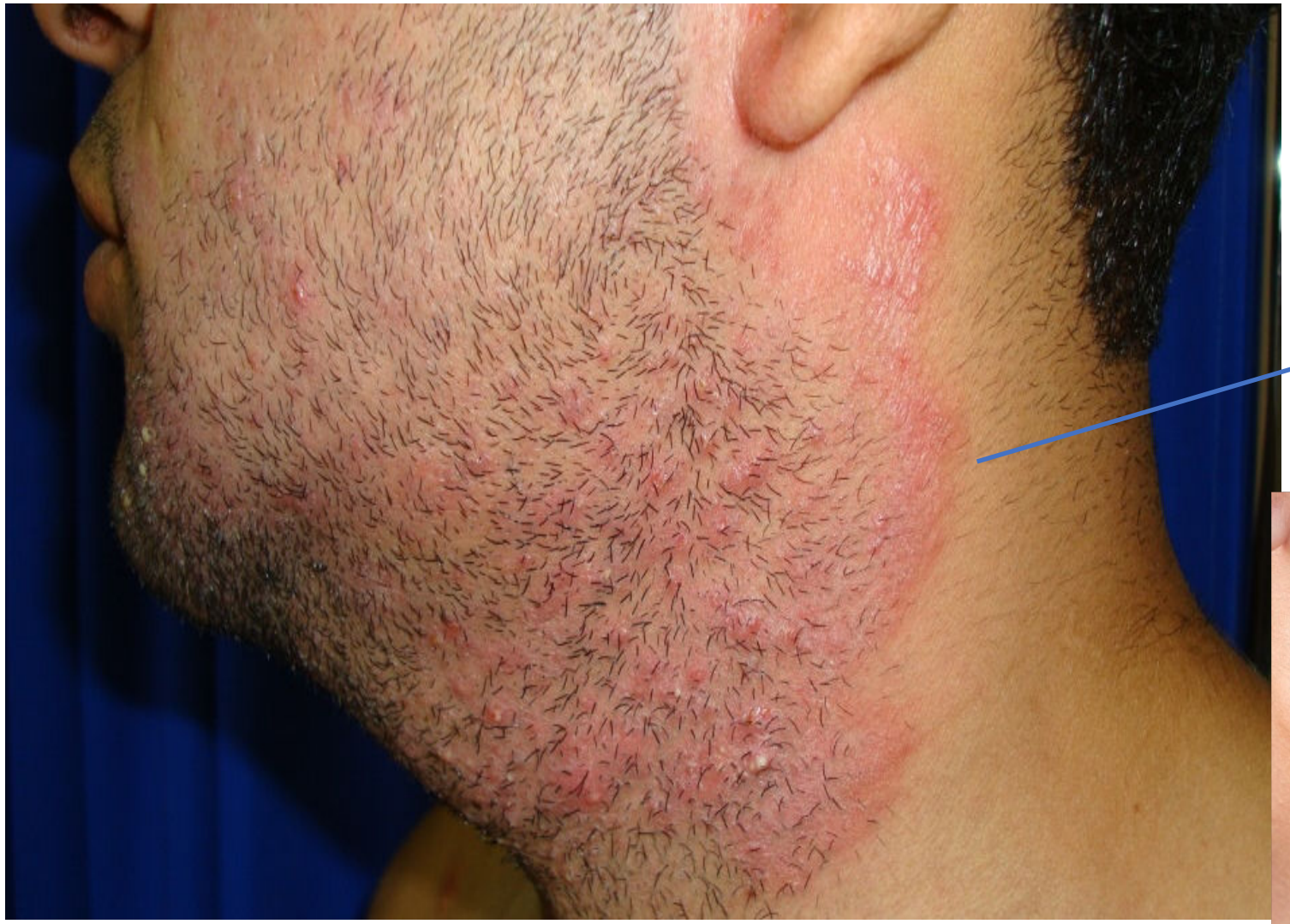


https://www.news-medical.net/image.axd?picture=Ringworm%20shutterstock_484652500%5B12%5D_1.jpg

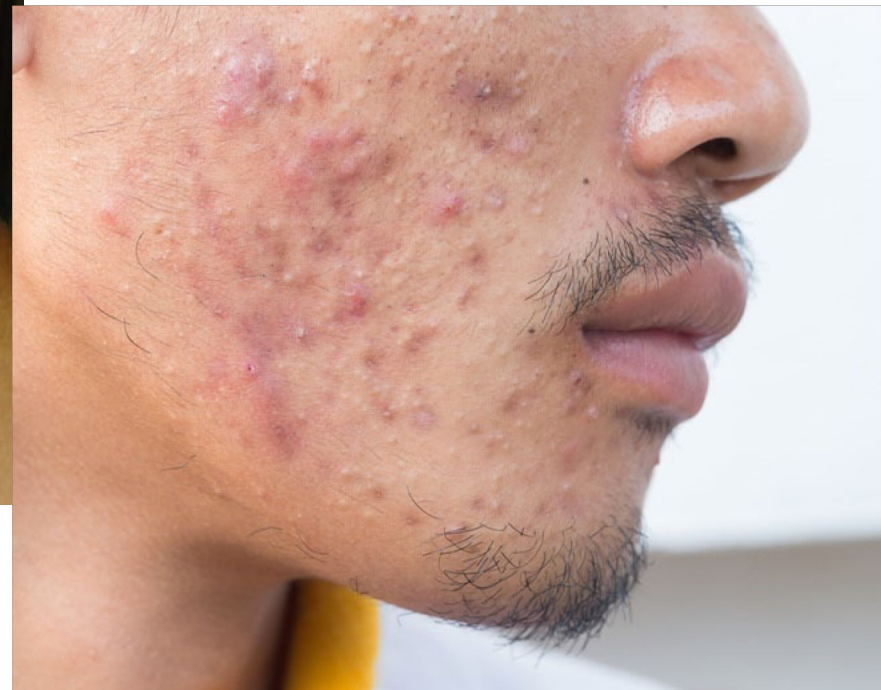


Feeding off of Keratin, present In hair and skin

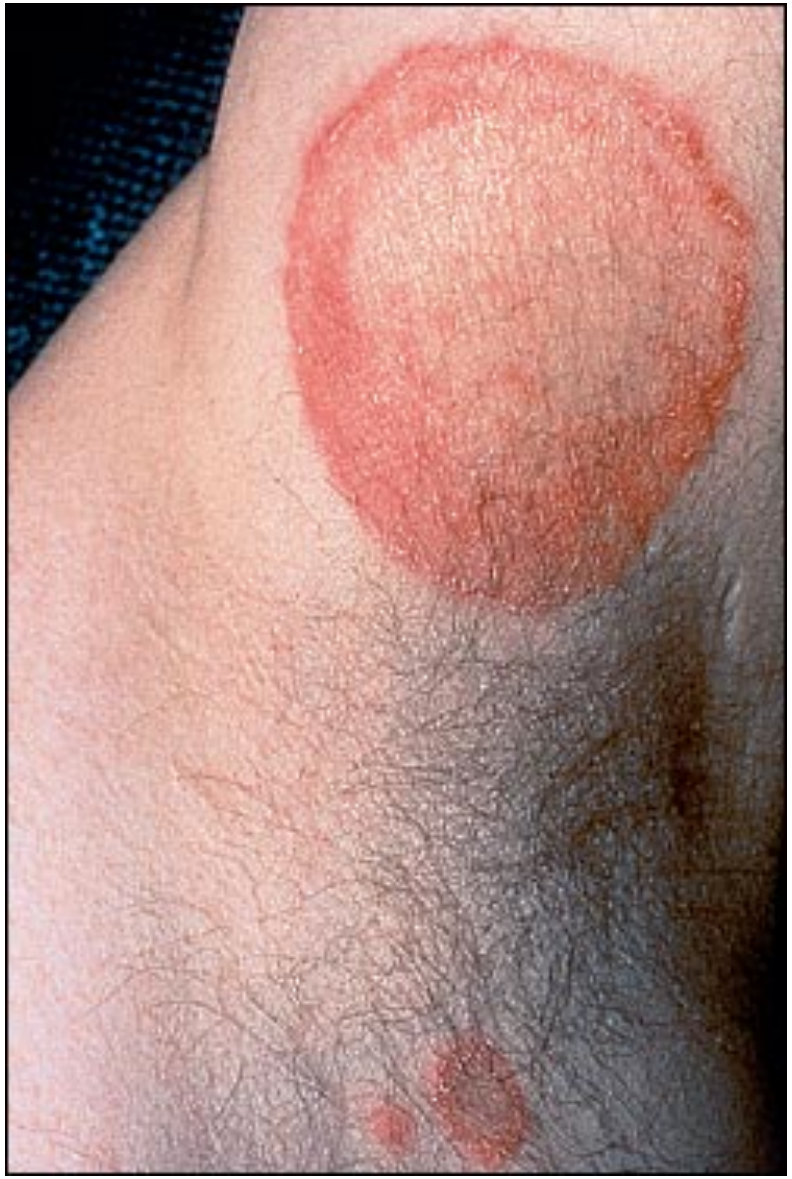
https://img.webmd.com/dtmcms/live/webmd/consumer_assets/site_images/articles/health_tools/ringworm_slideshow/dermnet_photo_of_ringworm_on_scalp.jpg?resize=646px:*&output-quality=100



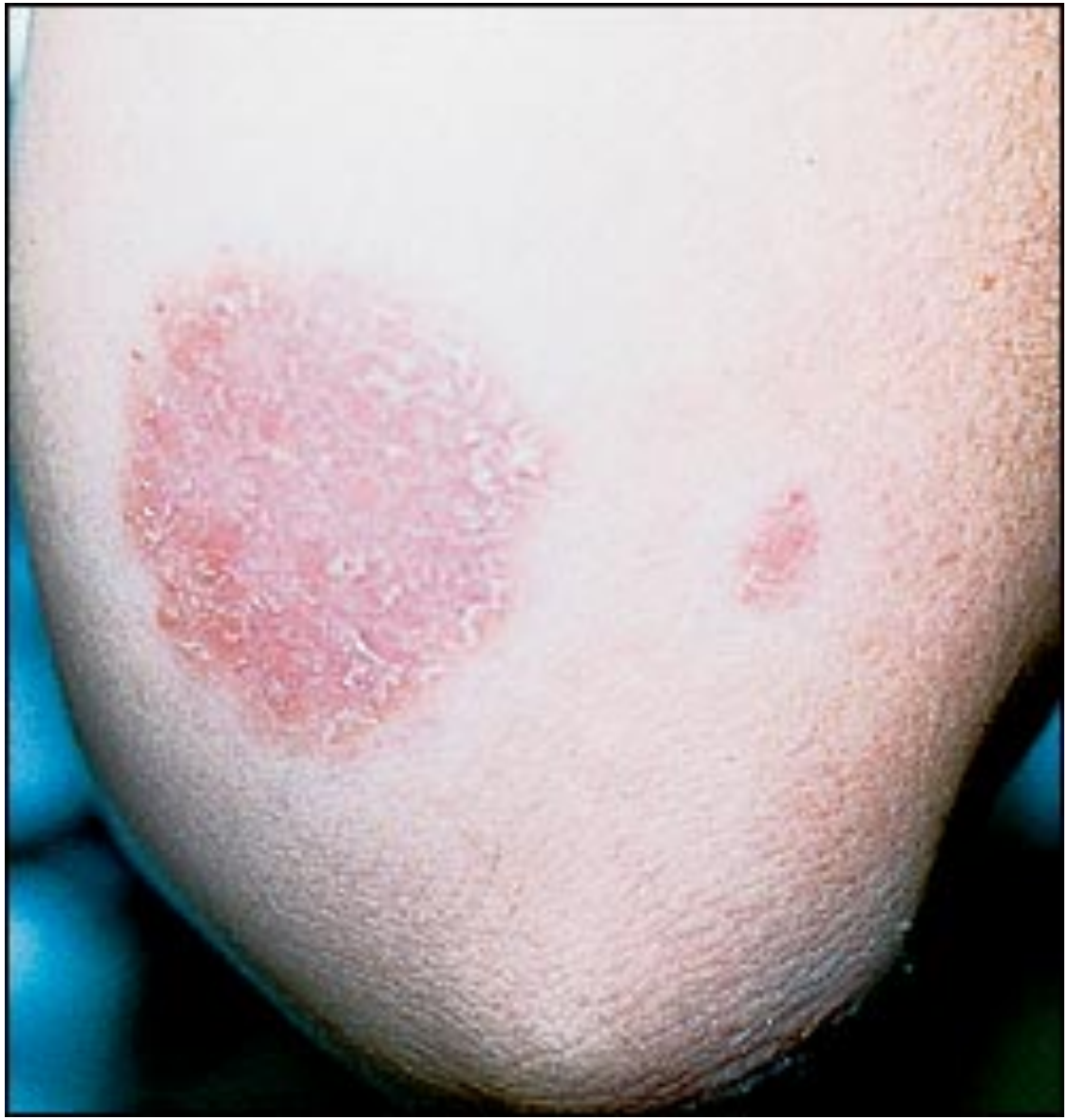
Demarcation lines hint at
A possible dermatophyte
Infection, rather than acne
vulgaris



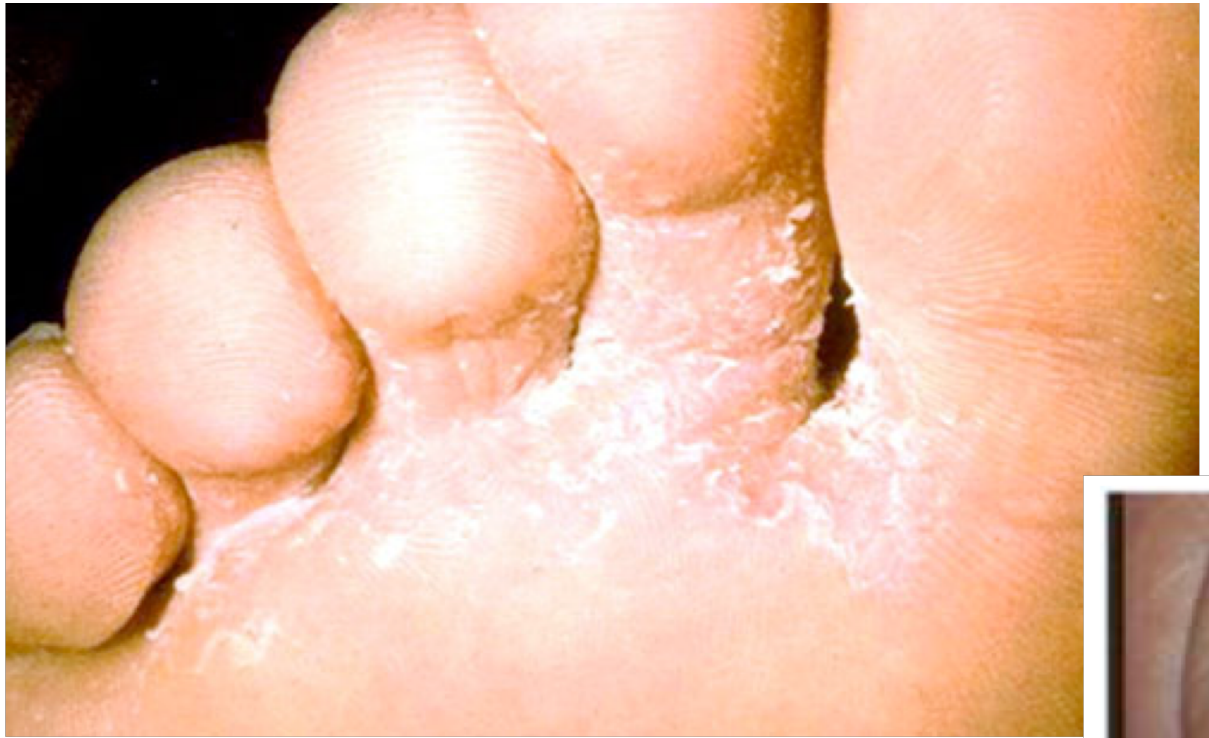
http://ringwormtinea.com/wp-content/uploads/2015/02/11.jpg



Tinea corporis

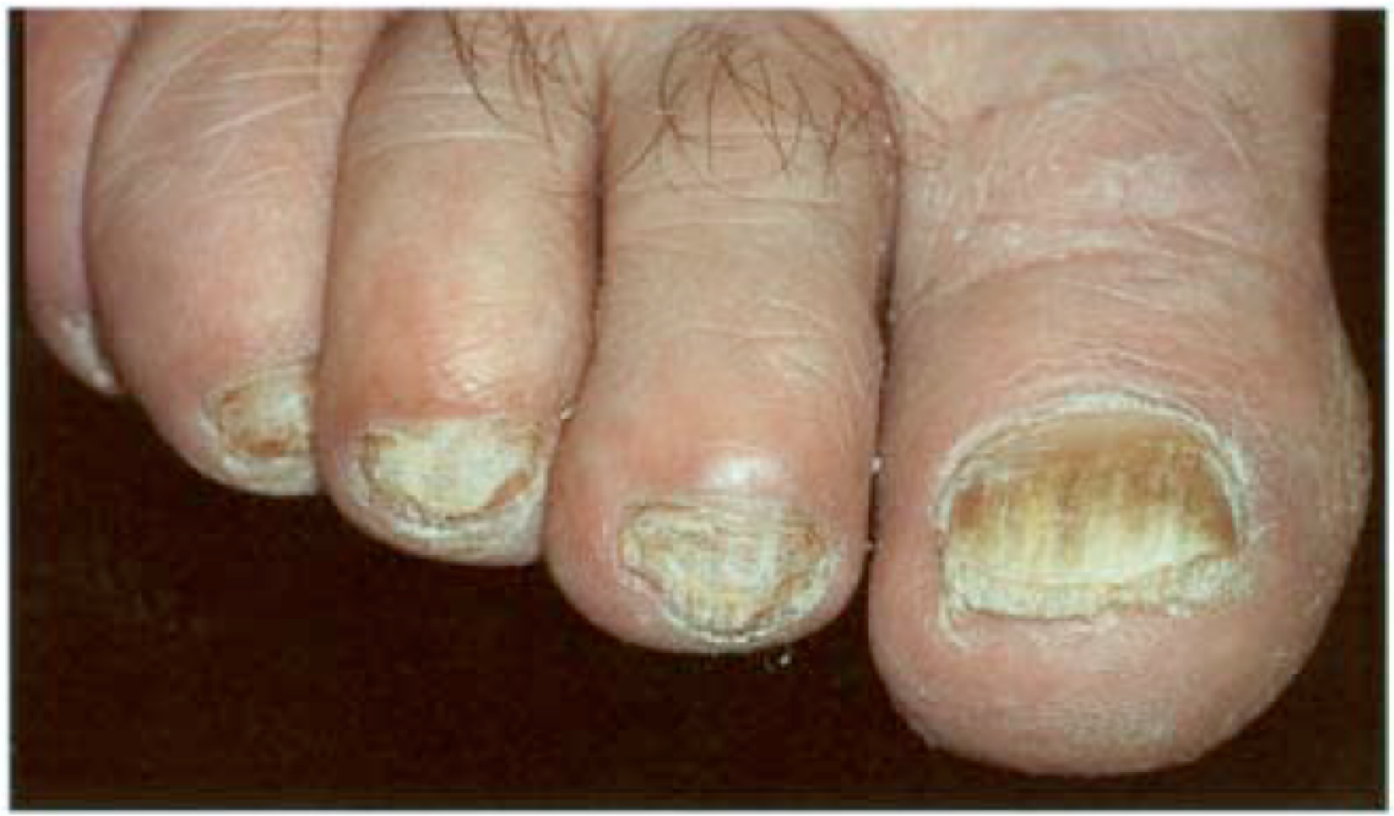


psoriasis



https://www.sporthuesca.com/piscinas-antihigienicas/

http://mulicia.pixnet.net/blog/post/26749579-%E7%94%B2%E7%99%AC-onychomycosis%EF%BC%8Ctinea-unguium



DIAGNOSIS

- The goal is to distinguish dermatophytoses from other causes of skin inflammation (such as psoriasis).
- *Infections caused by bacteria, other fungi, and noninfectious disorders (psoriasis, contact dermatitis) may have similar* features.
- **KOH mounts** of skin scrapings and infected hairs demonstrate **hyphae**.
- Some species fluoresce by a U.V. lamp.
- Culture is used when KOH preparations are negative.

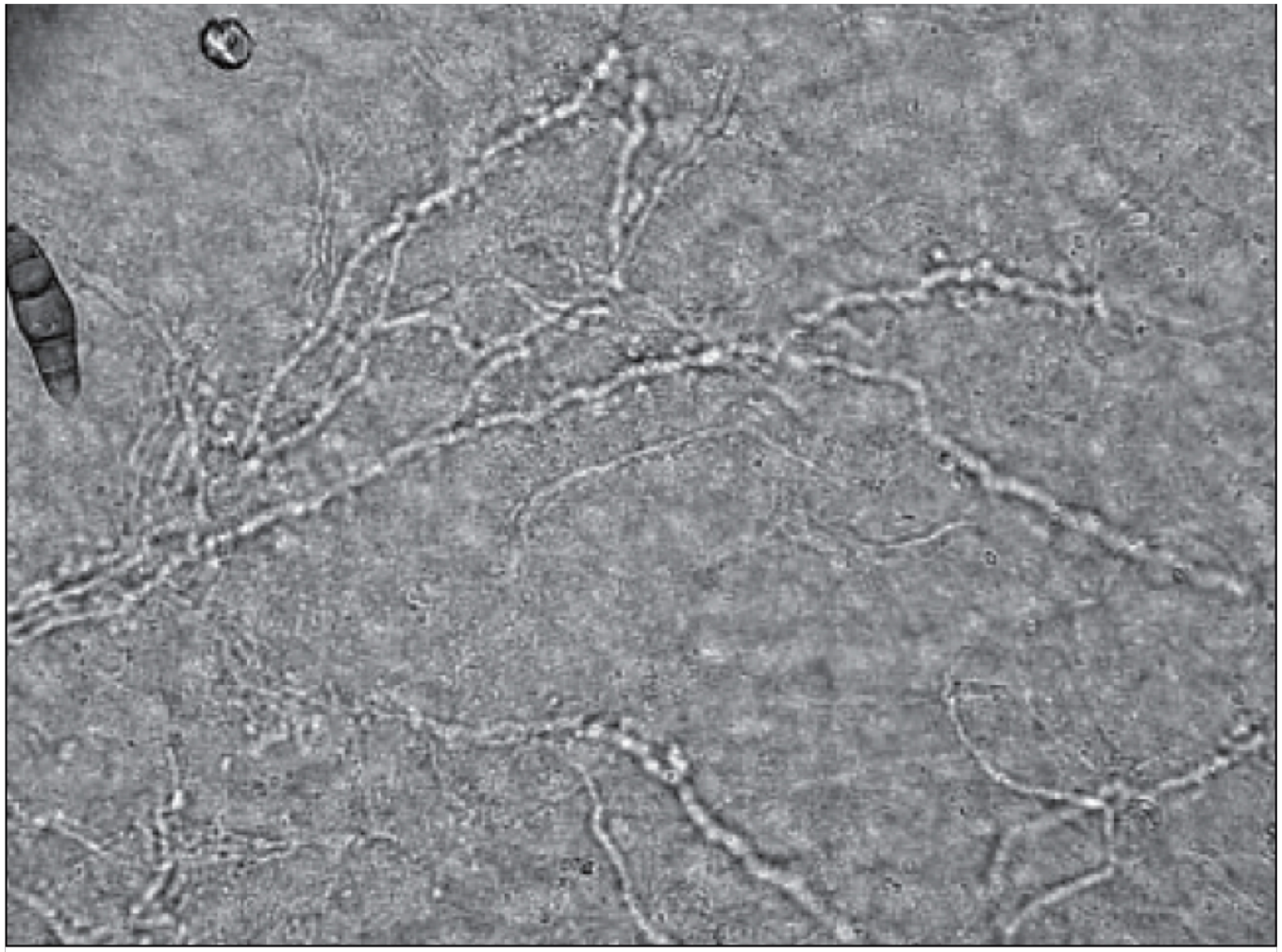


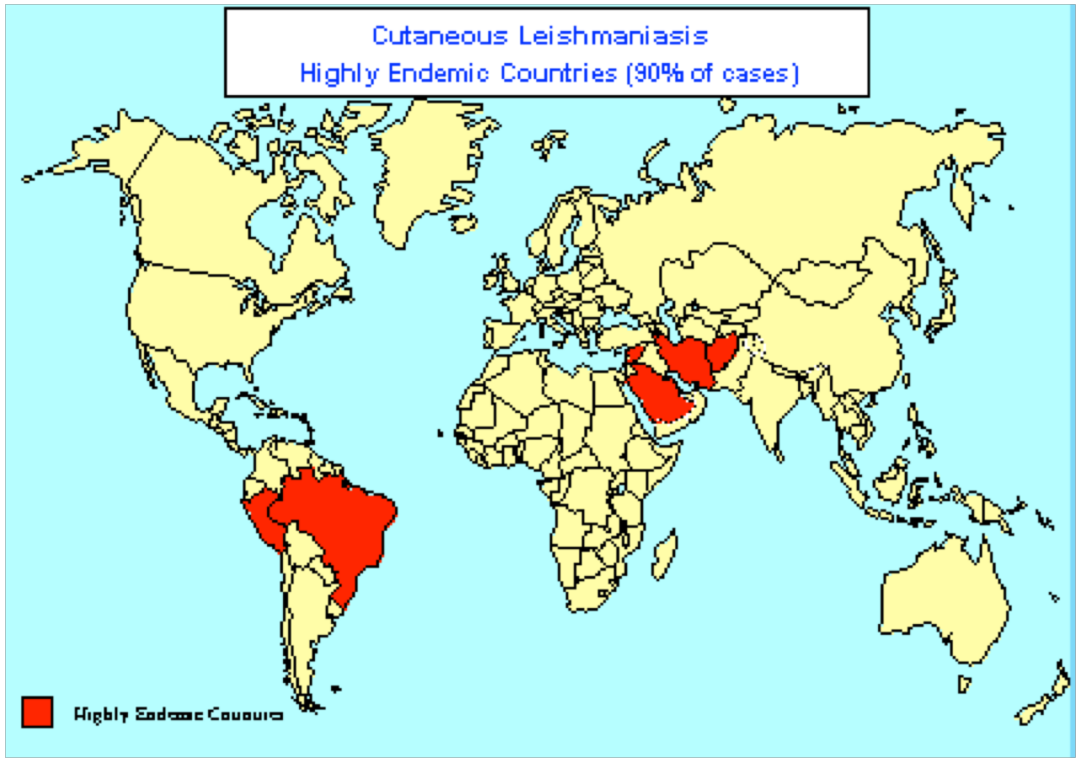
Figure 1: Skin scraping and KOH mount showing branching fungal hyphae in dermatophyte infection

http://www.bioline.org.br/showimage?dv/photo/dv06082f1.jpg

TREATMENT AND PREVENTION

- *Many local skin infections resolve spontaneously without chemotherapy*.
- Topical use of tolnaftate, allylamines, or azoles is usually sufficient .
- Nail bed and more extensive skin infections require systemic therapy with **griseofulvin** or itraconazole and terbinafine + combined with topical therapy.
- Therapy must be continued **over weeks to months**, and relapses may occur.
- No specific preventive measures such as vaccines exist.

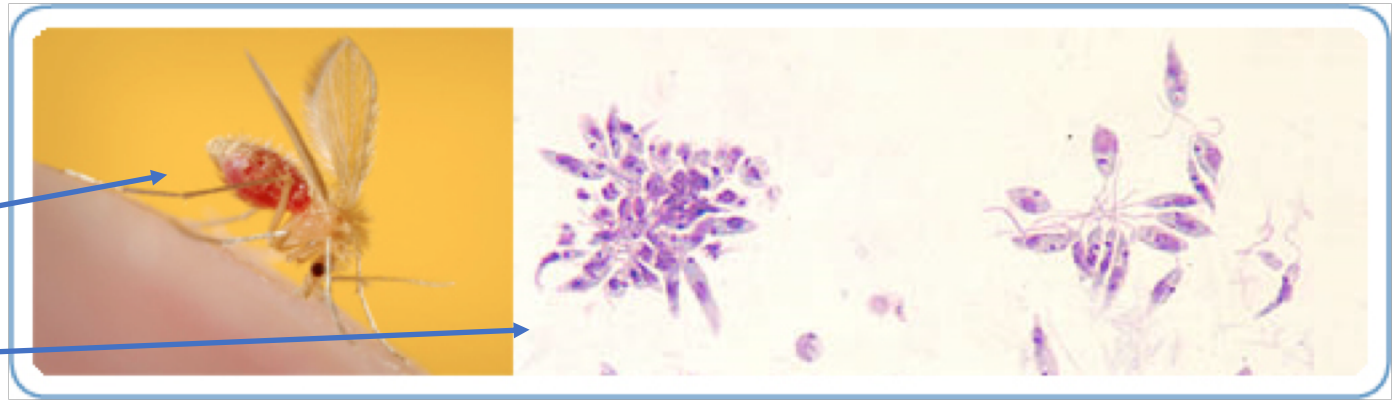
Cutaneous leishmaniasis



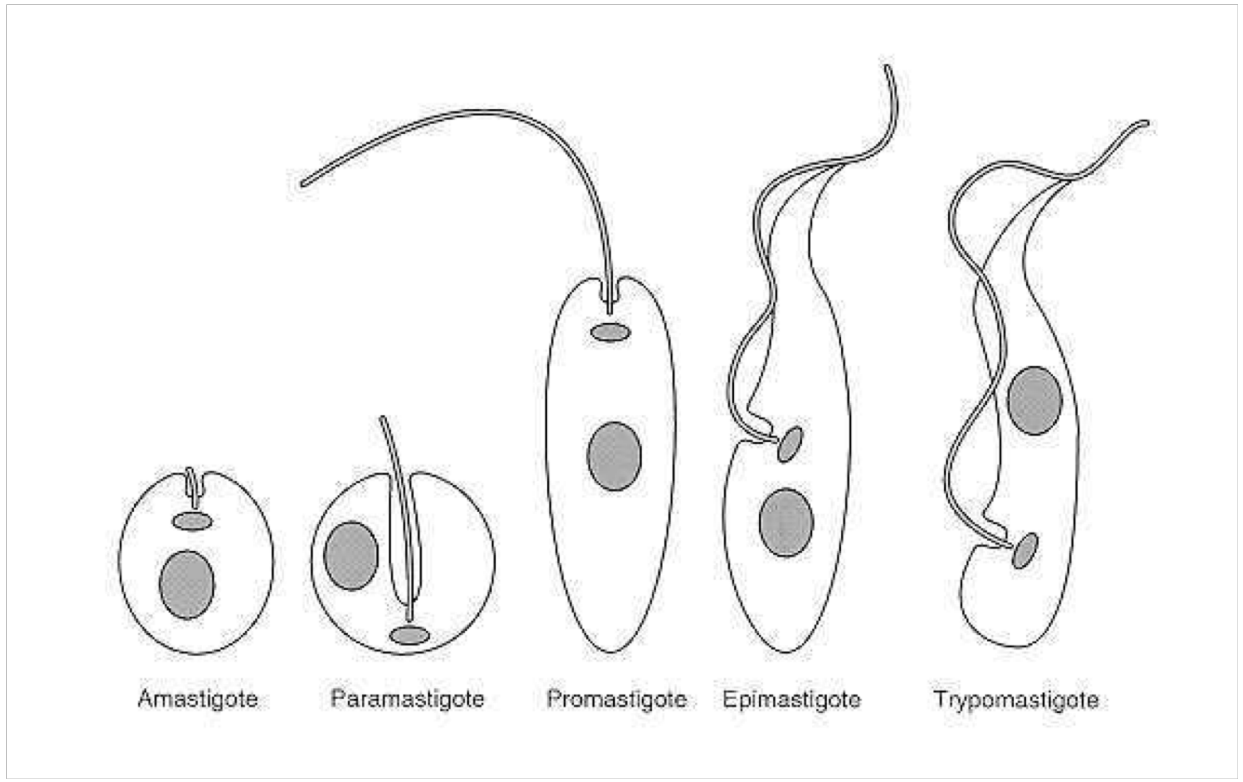
https://web.stanford.edu/group/parasites/ParaSites2006/Leishmaniasis/images/Cutaneous%20map2.gif

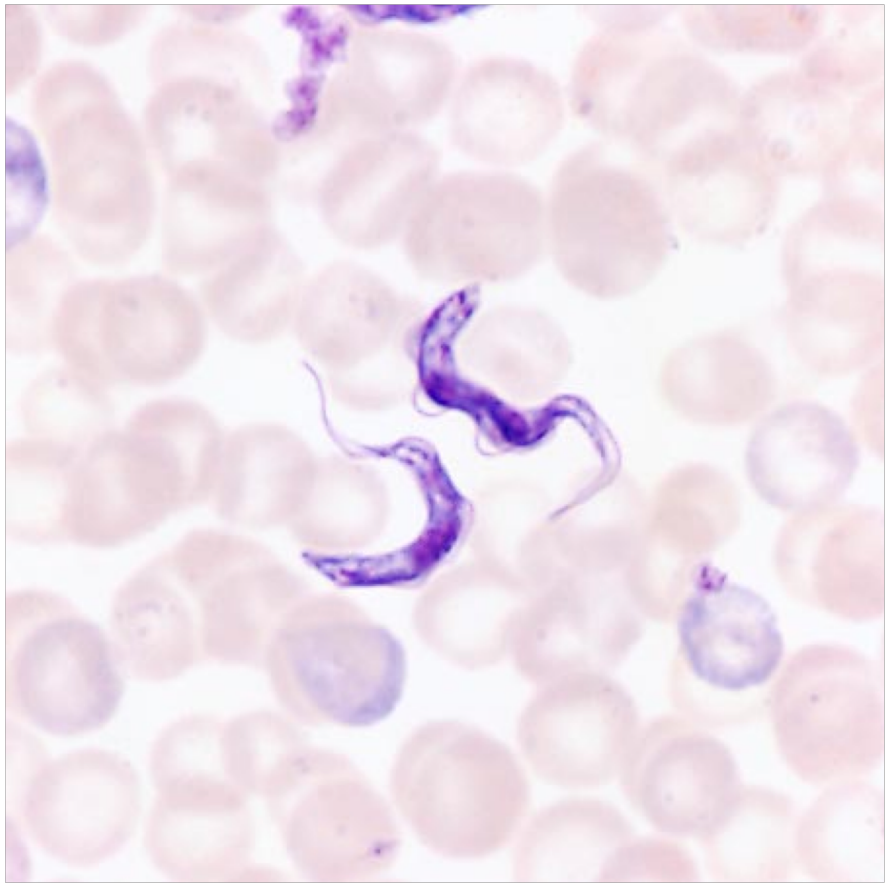
Vector and parasite

https://www.cdc.gov/parasites/images/leishmaniasis/home_page_image_leishmaniasis.jpg

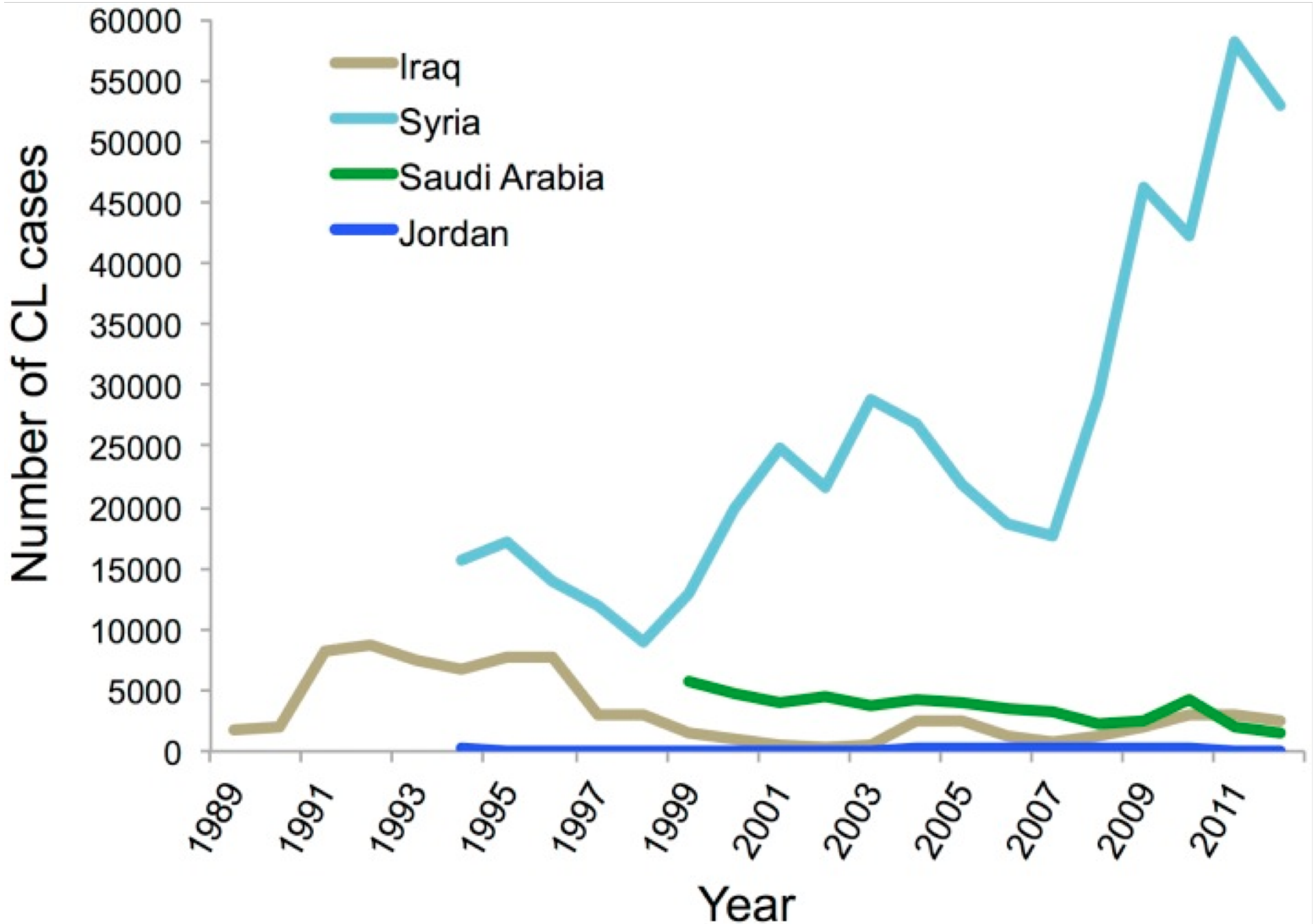


- **Transmitted by sandflies**
- Trypanosome (single flagellae)
- Parasite Has two forms: disease causing (resistant) form and infectious motile form
- *Deemed as a neglected tropical illness (causes mortality with small effort to battle it) → Disease of the poor*
- Leishmania comes in 3 forms (Visceral or Kala Azar- serious form), mucocutaneous and cutaneous. We will discuss the cutaneous form
- The cutaneous forms Has many types (other than visceral),
- 1) Old world in Asia, Africa and Europe → long incubation time (MONTHS 2-24)
- Skin lesion(s) on the face or leg: papules become necrotic and then pigmented scars (papule at site of bite → small nodules→ painLESS ulcer→ crust (pigmented) → leave ugly scars after healing (social issues)
- In 2015 over two thirds of new CL cases occurred in 6 countries: Afghanistan, Algeria, Brazil, Colombia, Iran (Islamic Republic of) and the Syrian Arab Republic.
- 2) Mucocutaeous: leads to partial or total destruction of mucous membranes of the nose, mouth and throat. Over 90% of mucocutaneous leishmaniasis cases occur in Bolivia (the Plurinational State of), Brazil, Ethiopia and Peru.





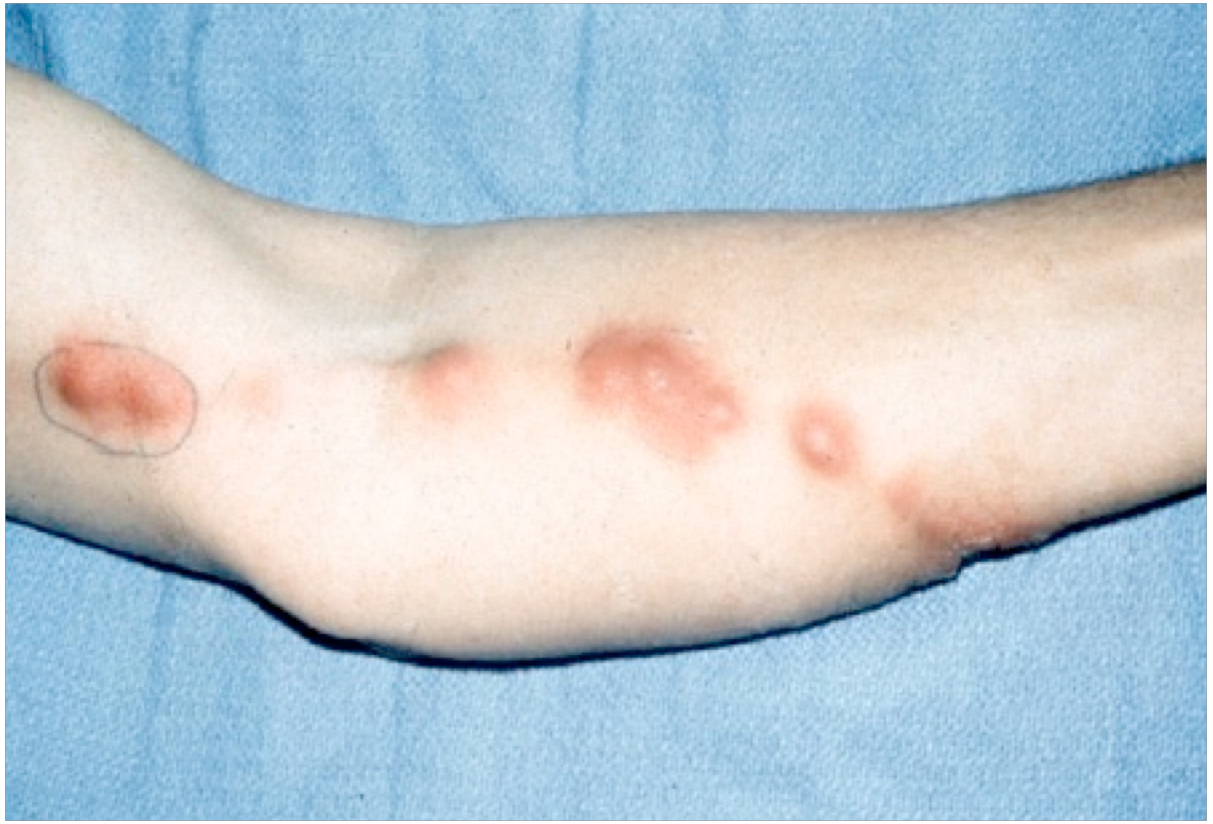
https://www.monaconatureencyclopedia.com/trypanosoma-gambiense/?lang=en



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4183486/figure/pntd-0003208-g001/

- Becoming an increasing problem in surrounding countries (syria and iraq) with poor sanitation and reduced living standards.
- *L. major and L. tropics* is most common
- Resolve over months, round depressed scars remain
- *May resemble other skin lesions (nodular lymphangitis) caused by waterborne pathogens (such as Sporothrix schenckii, Nocardia brasiliensis, Mycobacterium marinum, Leishmania (Viannia*).
- Nodular lymphangitis- granulamatous reaction to these pathogens on the path of lymphatics
- **700 000 to 1 million new cases and 20 000 to 30 000 deaths occur annually**

Sporotrichosis, on of many differentials



https://online.epocrates.com/data_dx/reg/920/img/920-1-hlight.jpg

- Dx of CL:
- Remove crusts and take skin scrape for microbiology
- Biopsy (punch or needle aspirate) to retrieve organism and detect under microscope.
- On CBC shows reduced cell count (red, white or all), Dx by culture

- Rx:
- Local heat to area for 2-3 hours a day

- Pentavalent antimonials (group of chemicals given for CL)
- Others include: (Liposomal amphotericin B, Oral miltefosine, Pentamidine)

- Given for a minimum of 20 days!

Infections Associated with Bullae

Bullae	
Staphylococcal scalded-skin syndrome	*S. aureus*
Necrotizing fasciitis	*S. pyogenes*, *Clostridium* spp., mixed aerobes and anaerobes
Gas gangrene	*Clostridium* spp.
Halophilic vibrio	*Vibrio vulnificus*

Organism	Type of Pathogenesis	Typical Disease	Predisposing Factor	Mode of Prevention
S. aureus	1. Toxigenic (superantigen)	Toxic shock syndrome	Vaginal or nasal tampons	Reduce time of tampon use
		Food poisoning	Improper food storage	Refrigerate food
	2. Pyogenic (abscess)			
	a. Local	Skin infection (e.g., impetigo, surgical-wound infections)	Poor skin hygiene; failure to follow aseptic procedures	Cleanliness; handwashing; reduce nasal carriage
	b. Disseminated	Sepsis, endocarditis[1]	IV drug use	Reduce IV drug use
S. epidermidis	Pyogenic	Infections of intravenous catheter sites and prosthetic devices	Failure to follow aseptic procedures or remove IV catheters promptly	Handwashing; remove IV catheters promptly
S. saprophyticus	Pyogenic	Urinary tract infection	Sexual activity	

IV = intravenous.

[1]For simplicity, many forms of disseminated diseases caused by *S. aureus* (e.g., osteomyelitis, arthritis) were not included in the table.

Staphylococcal scalded-skin syndrome (SSSS)

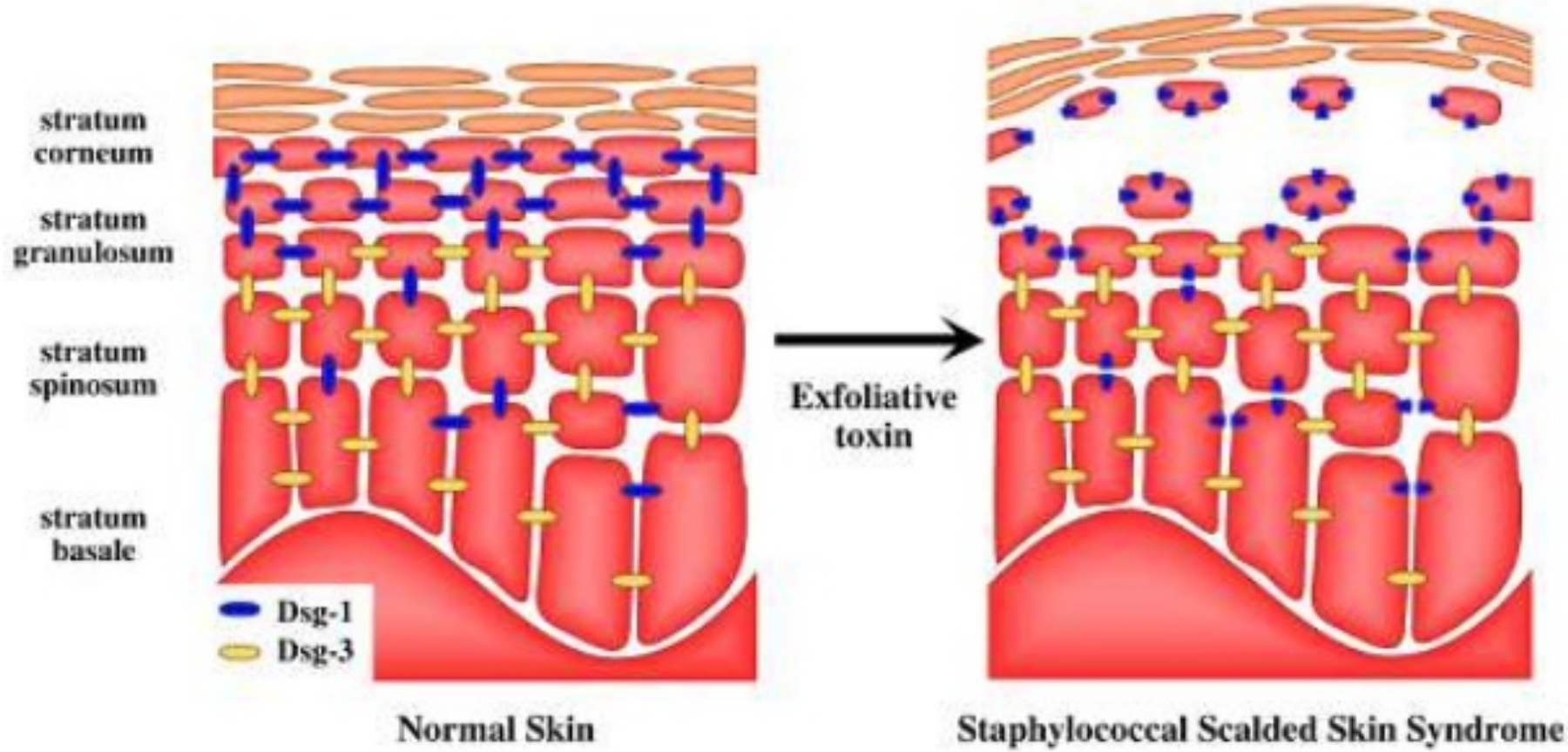
- Staphylococcal scalded-skin syndrome (SSSS) in neonates is caused by a toxin (exfoliatin) from phage group II (bacteria is infected by this phage, acquires the gene to produce the toxin)
- *S. aureus.* SSSS must be distinguished from toxic epidermal necrolysis (TEN), which occurs primarily in adults, is drug-induced, and is associated with a higher mortality rate.
- Punch biopsy with frozen section is useful in making this distinction since the cleavage plane is the stratum corneum in SSSS and the stratum germinatum in TEN

- Due to HEMATOLOGIC (not local) spread of staphylococcal EXOTOXIN.
- That means there is a point of infection somewhere else in the body

→ (Otitis media, Respiratory tract infection)

- *Staph aureus* that carry exfoliative toxins A and B (only about 5% of all *S. aureus* strains do carry these toxins)
- Breaks down desmoglein-1 resulting in Acantholysis (breakage of cell to cell adhesions)

PATHOPHYSIOLOGY



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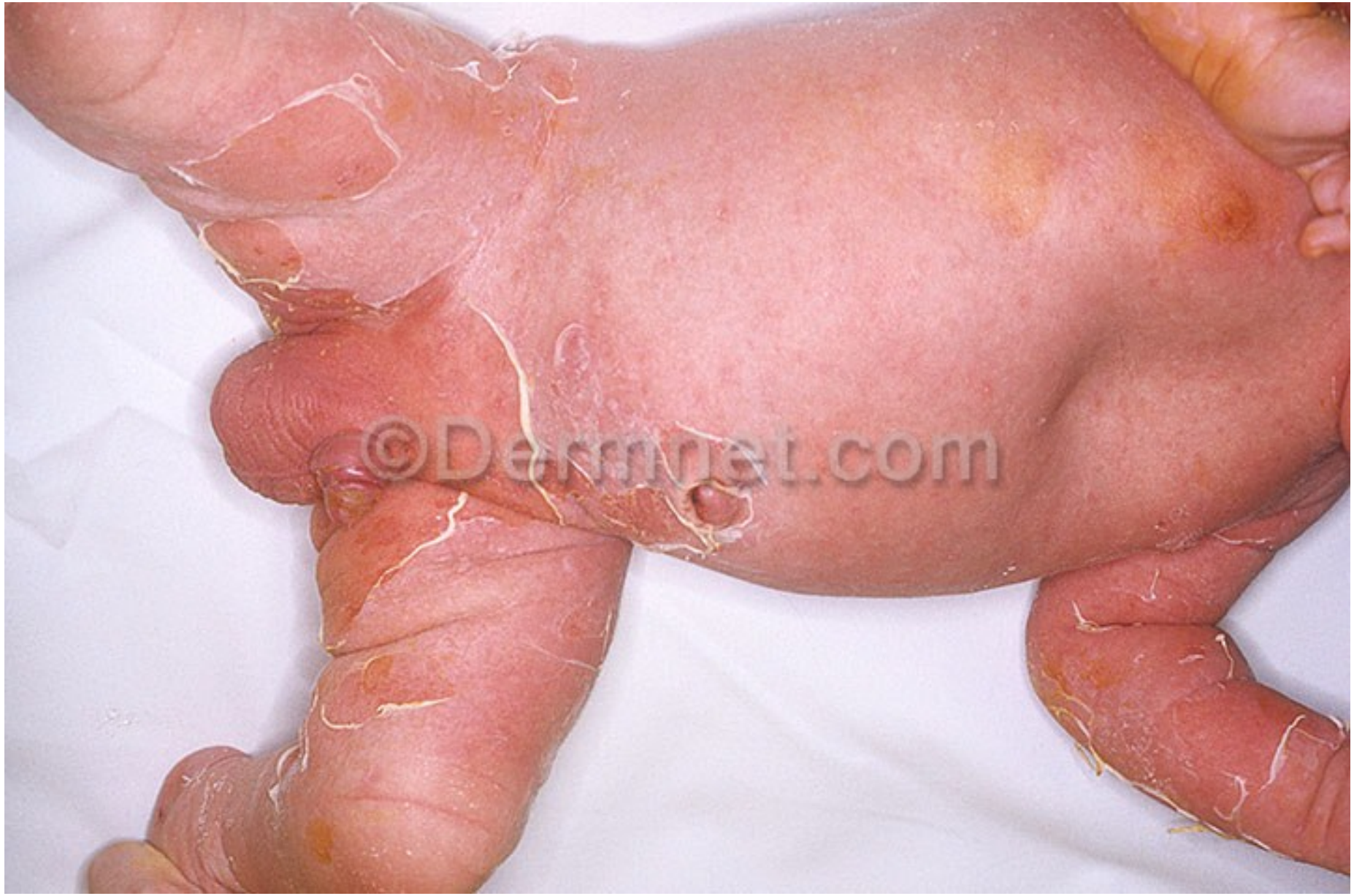
https://upload.wikimedia.org/wikipedia/commons/thumb/3/3e/OSC_Microbio_21_02_SSSS.jpg/300px-OSC_Microbio_21_02_SSSS.jpg

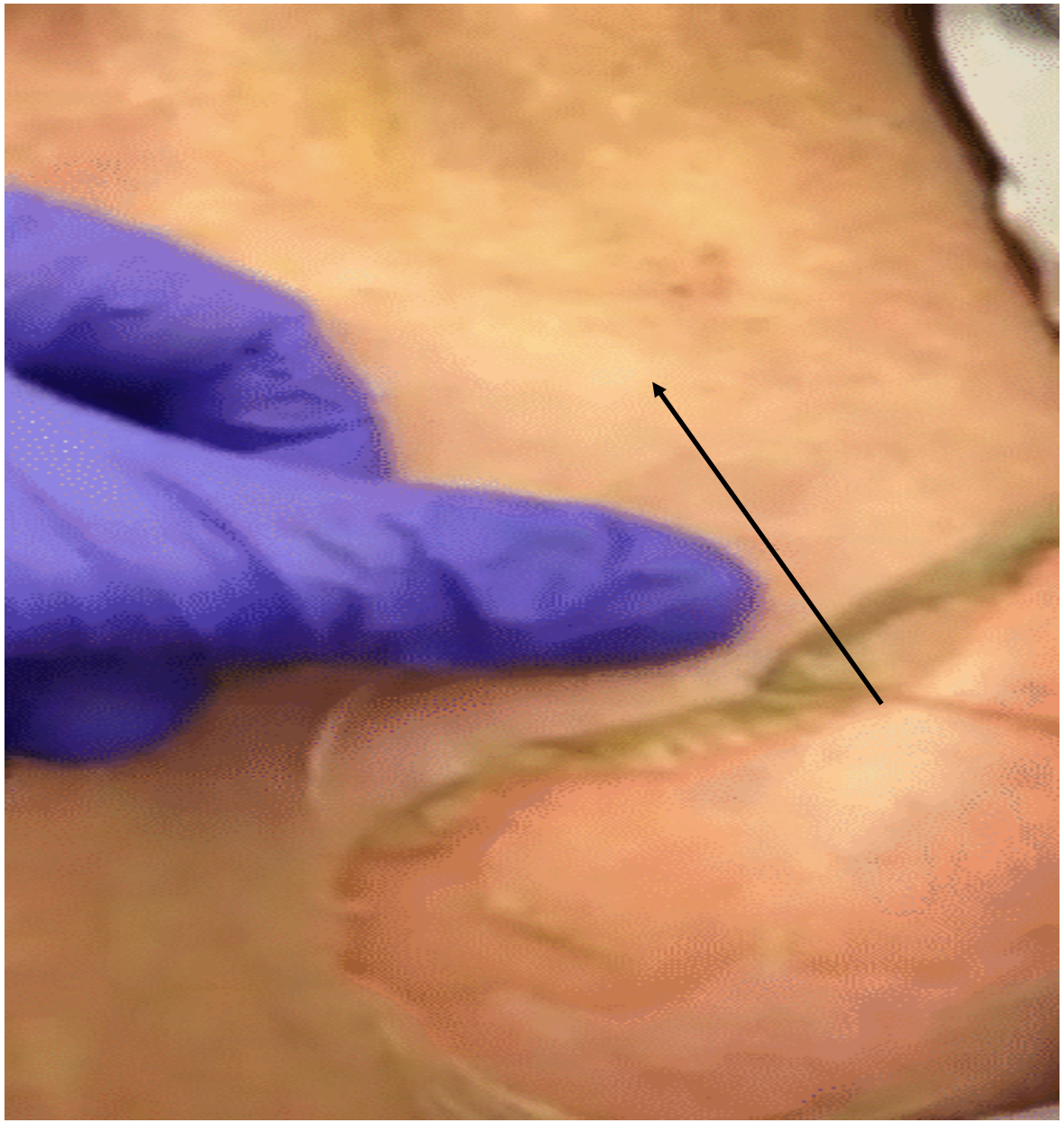


http://www.dermnet.com/dn2/allPG3/Staphylococcal-Scalded-Skin-Syndrome-3.jpg

SSSS

- Symptoms:
- → Preceded by a prodromal illness (URTI) or
- Otitis Media, Pharyngitis, Conjunctivitis
- → Then the actue phase hits: fever! + malaise (loss of fluids) and red painful skin with bullae formation

- Signs:
- Paper thin (peeling) skin
- Large flaccid BLISTERS, more in the flexor creases (see image above)
- Mucous membranes are SPARED!
- Positive Nikolsky's sign (detects acantholysis)



You make the bullae spread further by rubbing the side from affected skin to non affected skin

SSSS Dx and Rx

- Dx: blood cultures are often positive (remember hematologic spread of toxin – bacteremia)
- Skin biopsy will show typical acantholysis
- In lab we can do exotoxin assay

- Rx:
- ***MUST ADMIT THE CHILD (burn unit or ICU!)***
- Systemic IV antibiotics are given (anti MRSA or anti S. aureus) +
- *Systemic steroids (only if patient doesn't look toxic/otherwise it is not used)*
- In severe cases (IV Immunoglobulins and plasmapheresis) removal of plasma

As for TEN

- TEN, primarily seen in adults is potentially fatal.
- Intravenous γ-globulin is a promising treatment for TEN.

http://i.dailymail.co.uk/i/pix/2016/12/07/11/3B2162BB00000578-4009166-image-a-41_1481111581525.jpg