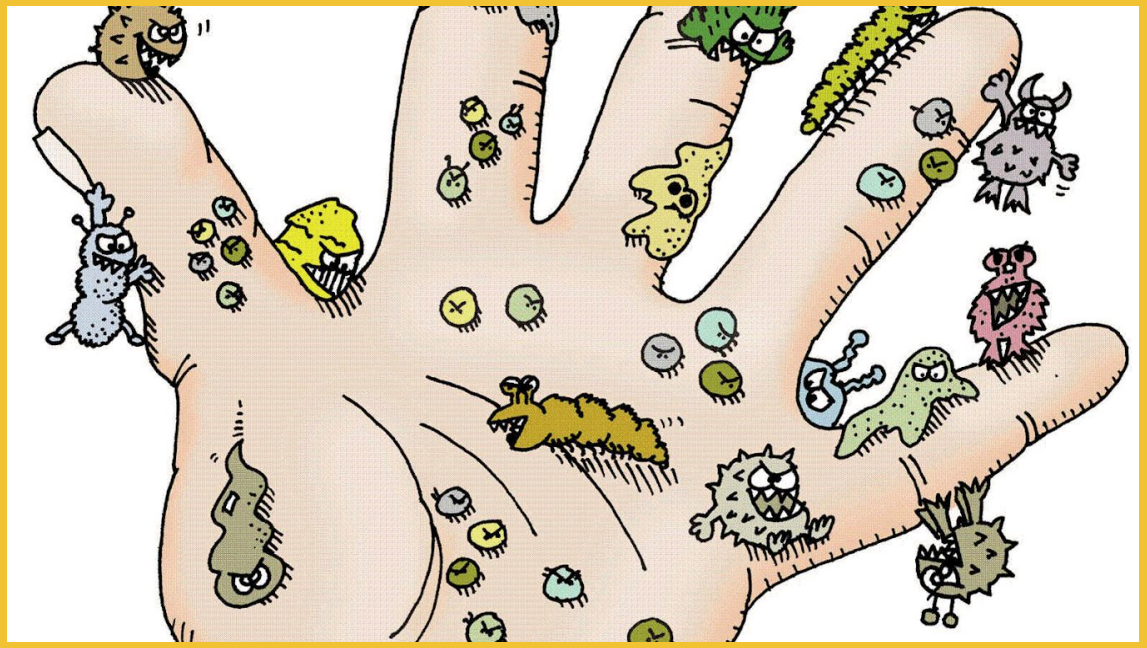
Bacterial skin infections



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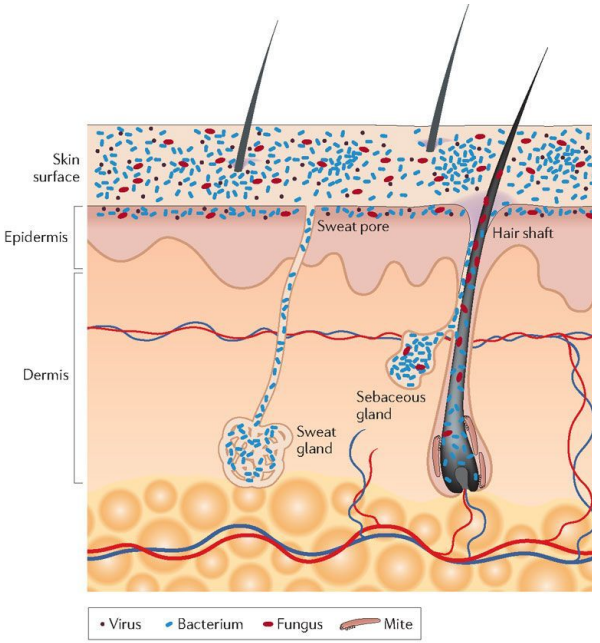
Skin microbiom

Human skin is colonized soon after birth by commensal bacteria that live on the surface of the epidermis and epidermal adnexa. Some bacteria are inoculated during vaginal delivery, others colonize the newborn's skin soon after birth. A few weeks after birth, the baby's microbiome resembles that of an adult. It stabilizes by about 3 years of age.

These bacteria have low virulence and are rarely a pathogen for humans. We refer to them as resident bacterial flora. Its role is to defend against the settlement of transient pathogenic flora. Microbiome imbalance causes various skin diseases, such as atopic dermatitis.

The acidic skin coat supports the growth of propionibacteria-producing propionic acid with antimicrobial activity. Keratinocytes produce antimicrobial peptides and proteins.

The skin's immune system plays a key role in defending against skin infections.

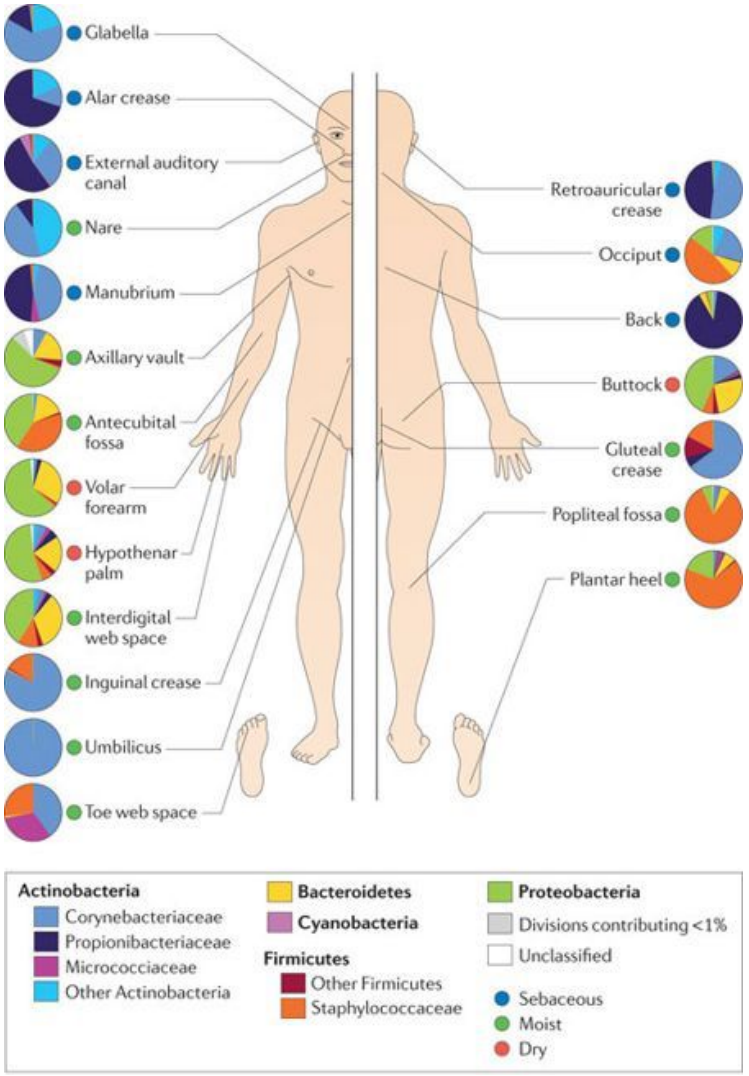


Skin microbiom

- is relatively stable in number
- about 1 million microorganisms from about 500 different species live in common symbiosis per 1 cm^2 of skin
- the microbiome is specific to each person similar to fingerprints
- microbial diversity is important for the balance of the microbiome
- one type of microorganism prevents the prevalence of the other

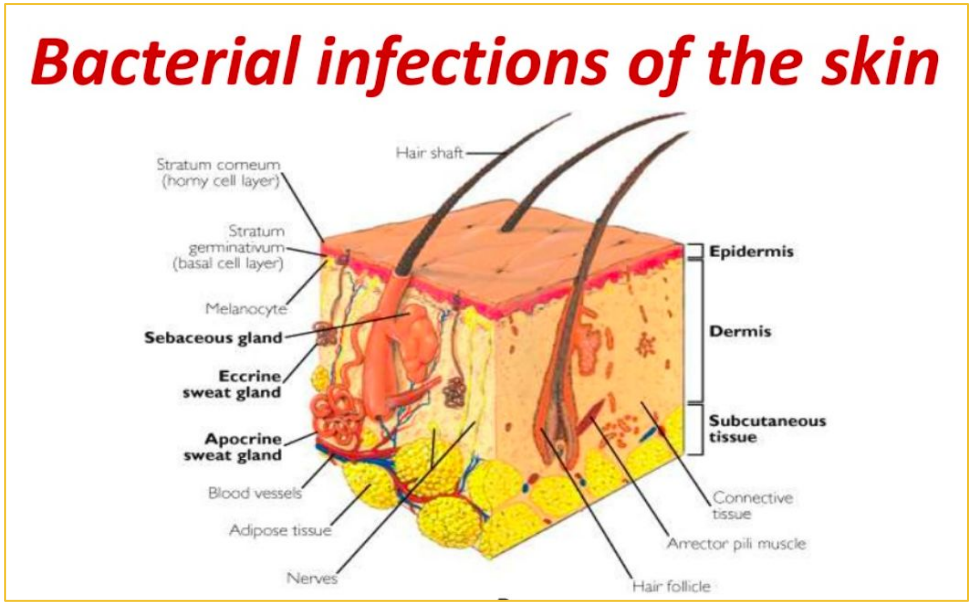
The most important components of the human microbiome include:

- Corynebacterium species
- Propionibacterium
- Micrococcus
- Bacteroidetes
- Cyanobacteria
- yeast Malassezia species
- Staphylococcus epidermidis and other coagulase negat. staph.
- Demodex folliculorum mite



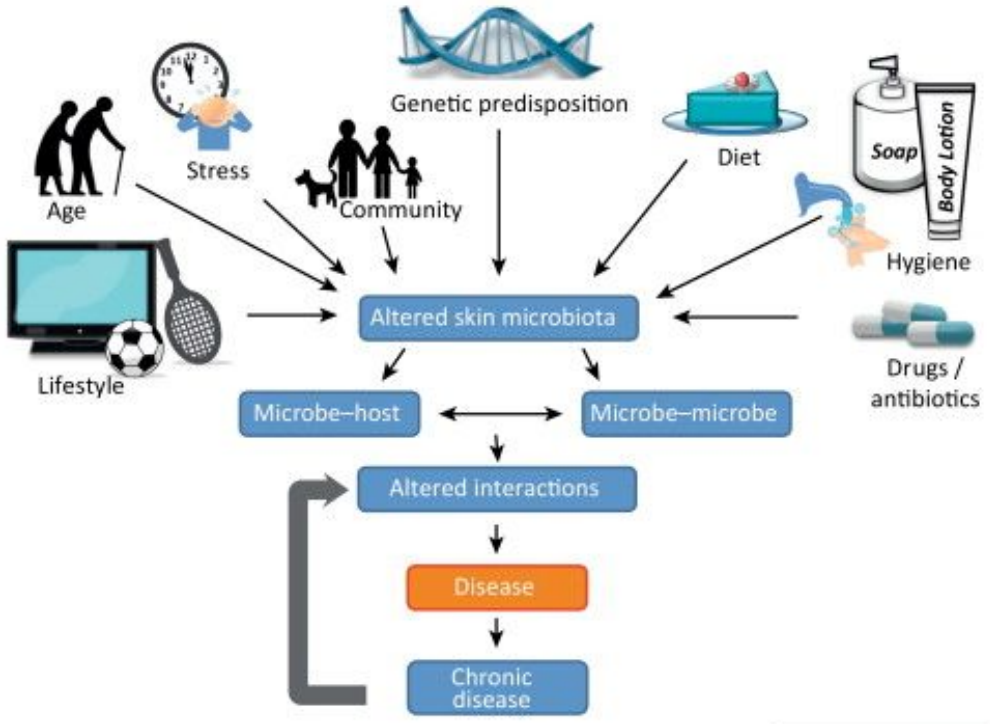
Division of bacterial infections - according to the causative agent:

1. Pyoderma
2. Infections caused by corynebacteria
3. Mycobacteriosis
4. Lyme disease
5. Anthropozoonoses
6. Actinomycosis



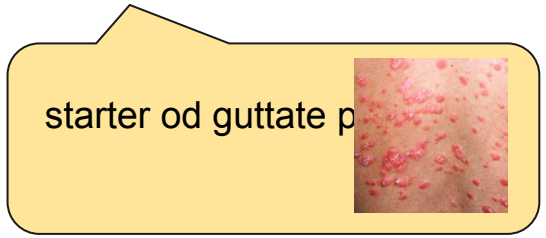
Predisposing factors of bacterial skin infections

- Alteration of normal skin flora
- Skin trauma
- Chronic dermatoses
- Immunodeficiency
- Corticosteroid therapy
- Malnutrition
- Peripheral vascular disease
- Systemic diseases (diabetes)



1. Pyoderma

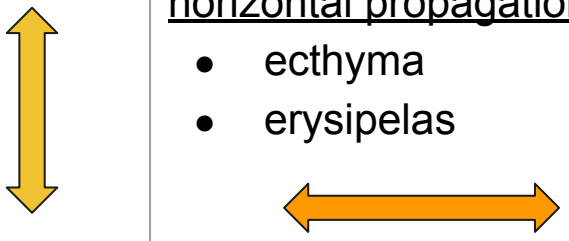
- bacterial infections of the skin caused by staphylococci and streptococci
- from Greek: pyon - pus, derma - skin
- most common agents: **Staphylococcus aureus, Streptococcus pyogenes ß-haemolyticus group A**
- widespread
- Infections can be:
  - superficial x deep and invasive
  - primary x secondary
  - when penetrating the bloodstream and lymphatic system, they cause disseminated manifestations such as coagulopathy, vasculopathy



- manifestations may be associated with follicles / sweat glands / nails
- some strains capable of producing exotoxins, which act either directly at the level of desmosomes (eg staphylococcal skin syndrome) or indirectly by releasing mediators - cytokines (eg toxic shock syndrome)
- the development of the infection depends on the overall condition of the organism, the local condition of the skin (microbiome imbalance, disorder of the skin's barrier function), environmental influences, bacterial virulence

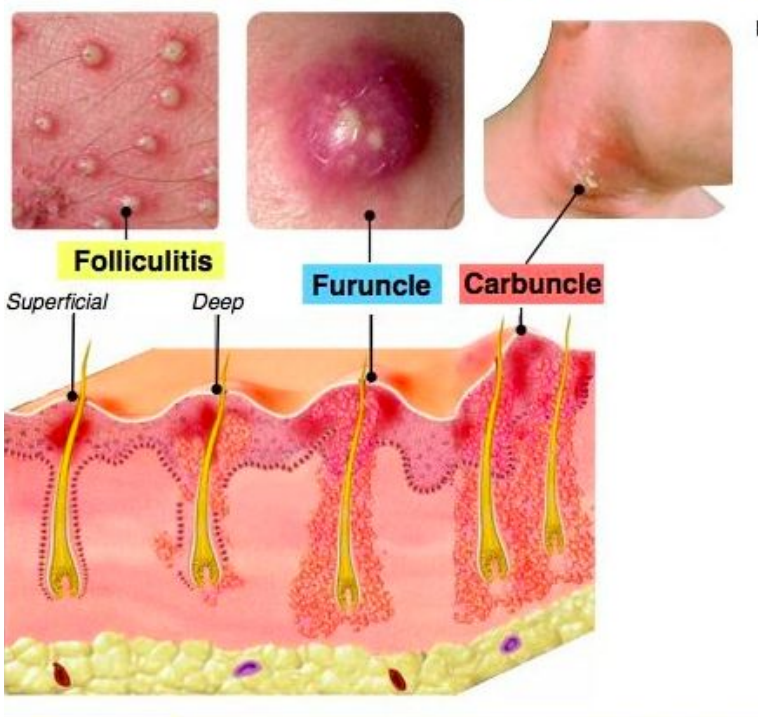
Overview of pyoderma according to the causative agent and the affected skin layer

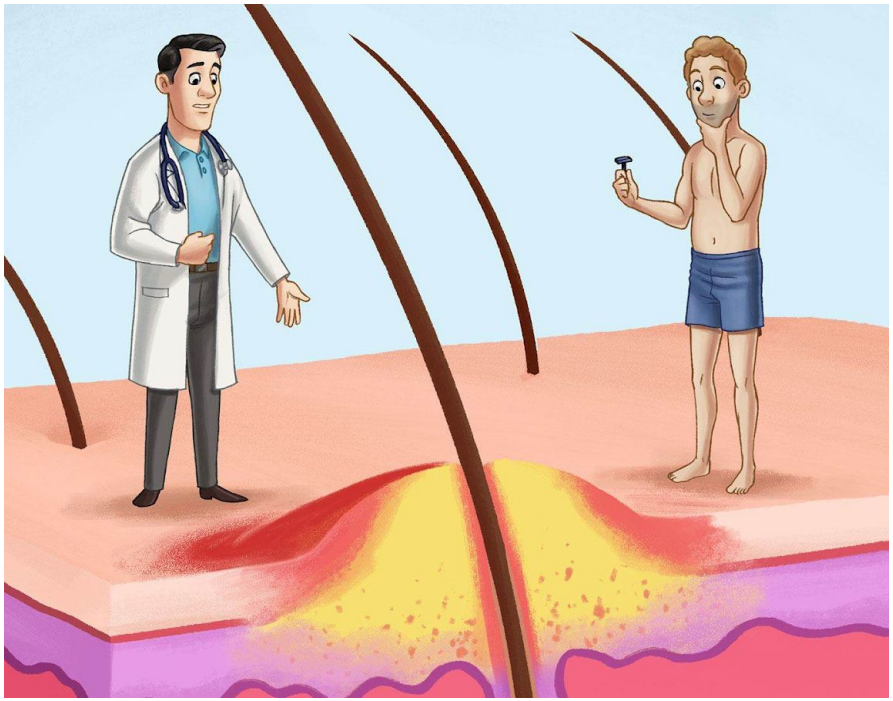
Layer of skin	**Staphylococcus aureus**	**Streptococcus pyogenes**
epidermis	• impetigo contagiosa (bullous form) • staphylococcal scalded skin syndrome	• contagious impetigo (makulovezikulózní form)
dermis	<u>vertical propagation along follicles:</u> • folliculitis • furunculus • carbunculus • hidradenitis suppurativa	<u>horizontal propagation:</u> • ecthyma • erysipelas



1.1 Pyoderma bound to follicles

- purulent inflammation of the hair follicles, or their surroundings
- follicles are a suitable entrance for infection, so these are relatively common
- predisposing factors: mechanical influences (shaving, rubbing clothing) damage the exit of the follicle on the skin surface, facilitate the penetration of infection, especially in hot environments
- caused by: Staphylococcus aureus - vertical spread along the follicles

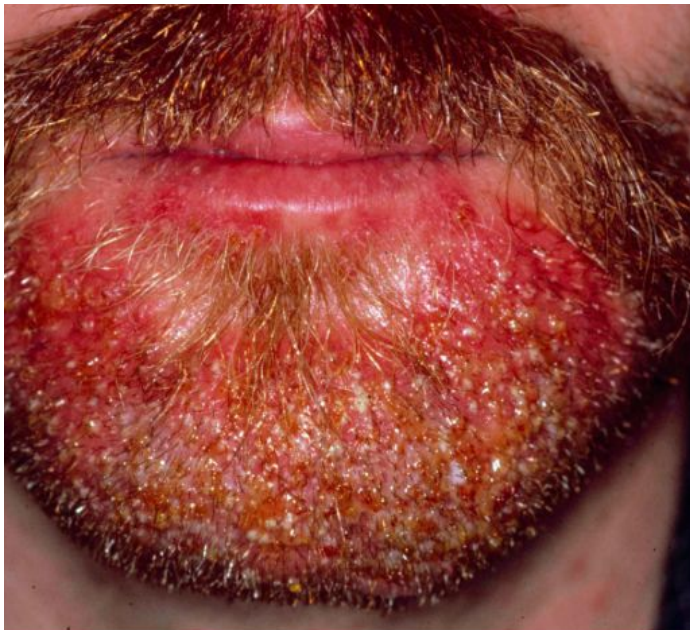


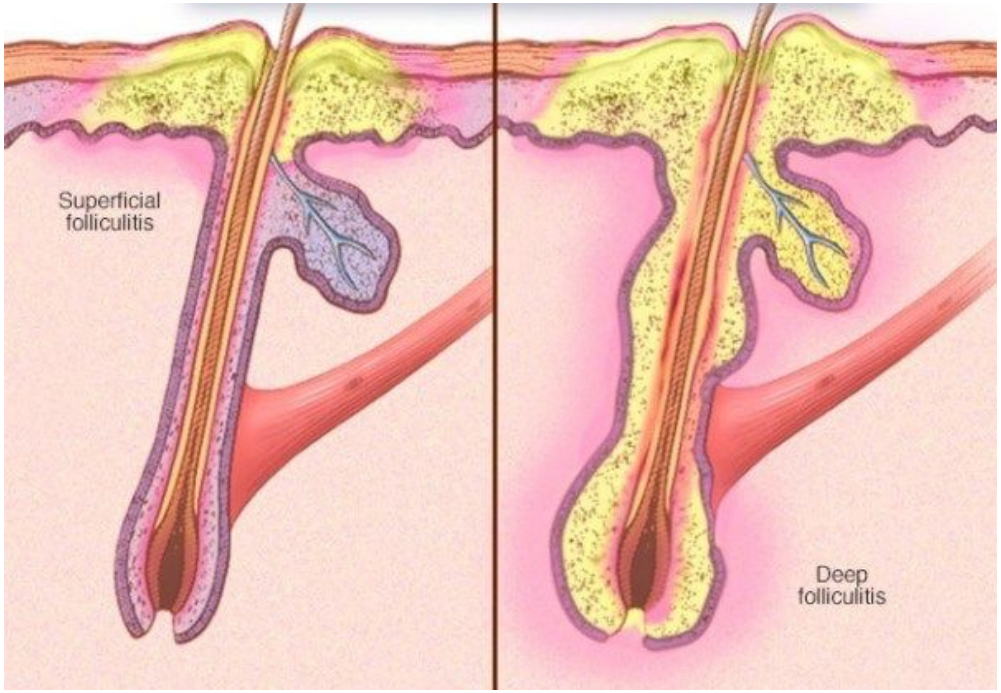


1.1 Pyoderma bound to follicles

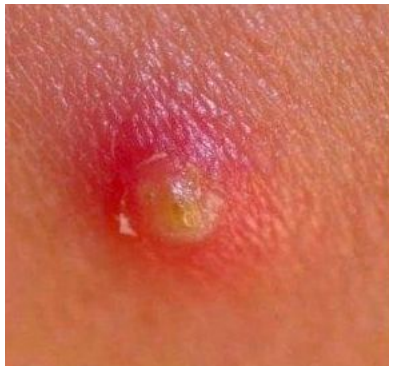
division:

- OSTIOFOLLICULITIS - affects the orifice of the follicle, where arises a pustule with a centrally running hair
- FOLLICULITIS - affects the entire follicle, crusts on the surface, heavily hairy areas, 2 units:
  - F. simplex disseminata - anywhere in the body, diabetics, intertriginous areas, areas of friction with clothing, malhygiene, increased sweating, iatrogenically after application of tar externals
  - F. barbae = sycosis barbae staphylogenes - in the face of men in the beard, planar deposits with infiltrates and bumps, chronic, recurrent

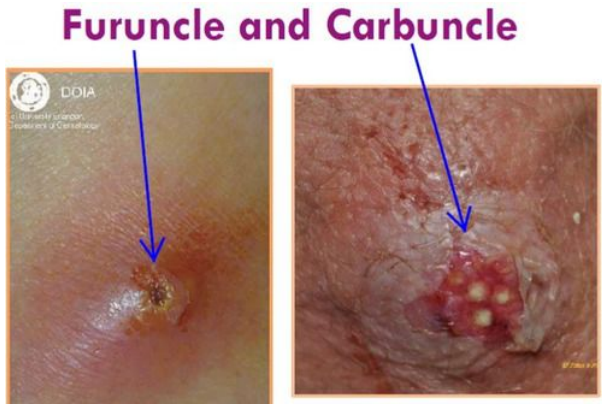


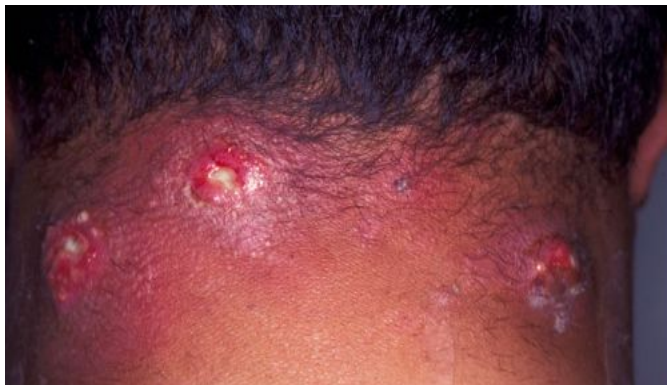


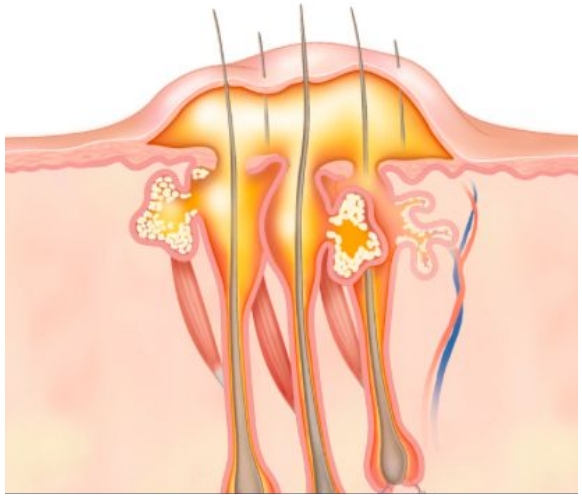
1.1 Pyoderma bound to follicles



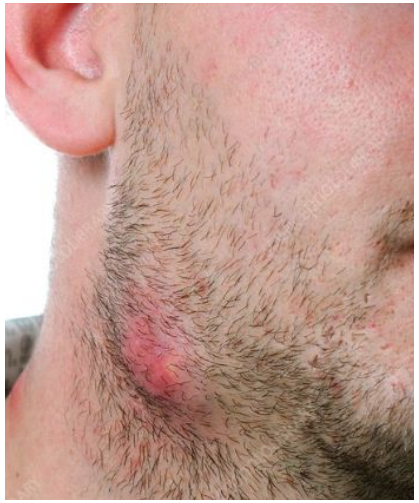
- **FURUNCULUS and CARBUNCULUS**
  - these are follicular skin abscesses
  - predilection: neck, axillae, buttocks, groin
  - predisposing factors: hot and humid environment, obesity, hyperhidrosis, more in men, diabetics, pac. with malnutrition, HIV infection or immunodeficiency
  - furuncle - a deeply deposited sharp red nodule / abscess with a central yellow pin formed on the basis of folliculitis, later is in the center perforation and then purulent secretion with emptying of the contents, temperature rise may occur, very painful, furunculosis = several furuncles in the same time, the area of the upper lip and nose = "trigonum mortis" - there is a risk of thrombosis of the cavernous sinus
  - carbuncle - is formed by the fusion of several neighboring furuncles, a large bump with several fistulas, the neck of strong men, accompanied by fever, leukocytosis, bacteremia



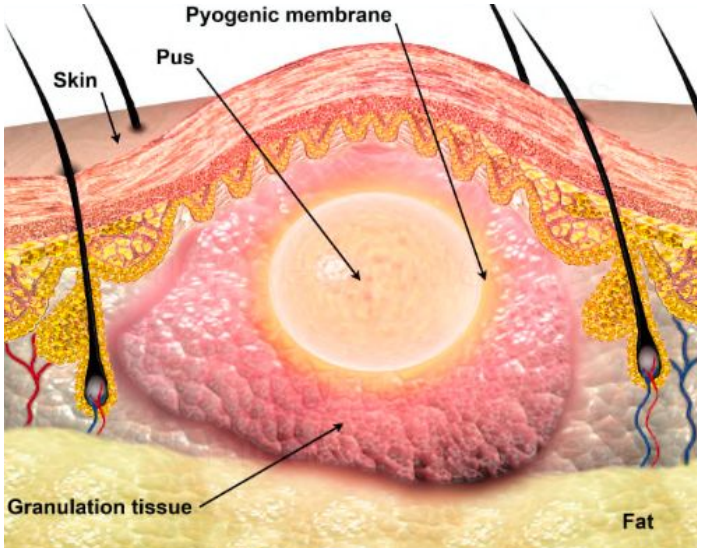




Skin abscess

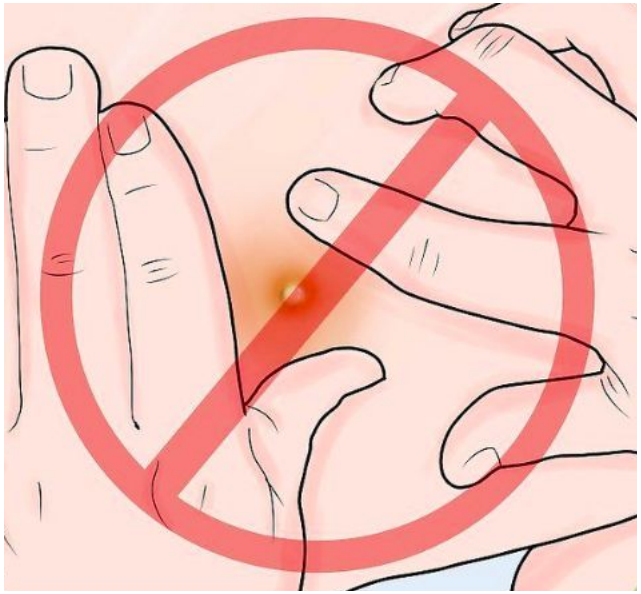


- located inflammation with collection of pus and destruction of tissue
- can arise as complications of acne, paniculitis, hidradenits
- sharp red subcutaneous nodulus with palpation warmer skin towards surroundings, with surrounding swelling
- accumulation of pus occurs fluctuation (= "waves", from lat. Fluctus = wave, it is a symptom of the accumulation of fluid in the bounded part of body of abscess, demonstrates with two fingers that alternately compress suspicious skin parts)



Therapy

- local: alcohol solutions of antibiotics, disinfectants with salicyl acid and iodine
- saloxyl (ointment with ichtamol, "black ointment")
- incision, releasing the necrotic pin and evacuation of pus, drainage
- chronic folliculitis: possibly systemic antibiotics
- furunculosis, carbunkle: systemic antibiotics according to sensitivity, eg. beta-lactamase, tetracycline, macrolides

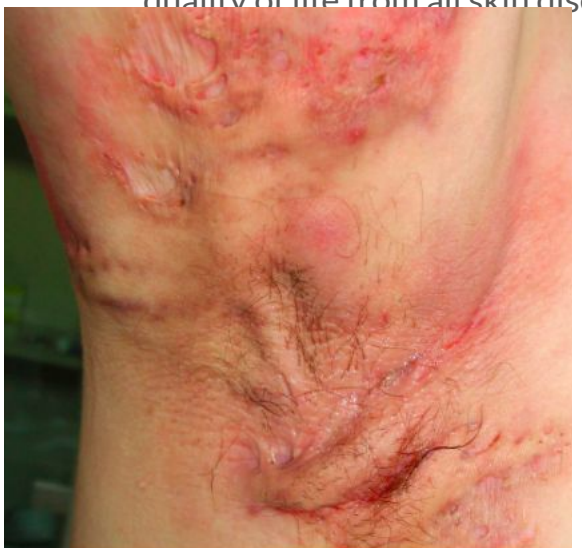


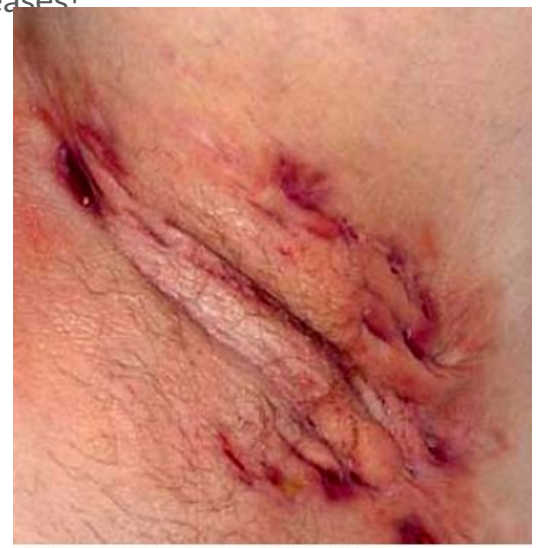
Mechanical handling increases the risk of dissemination of infection!

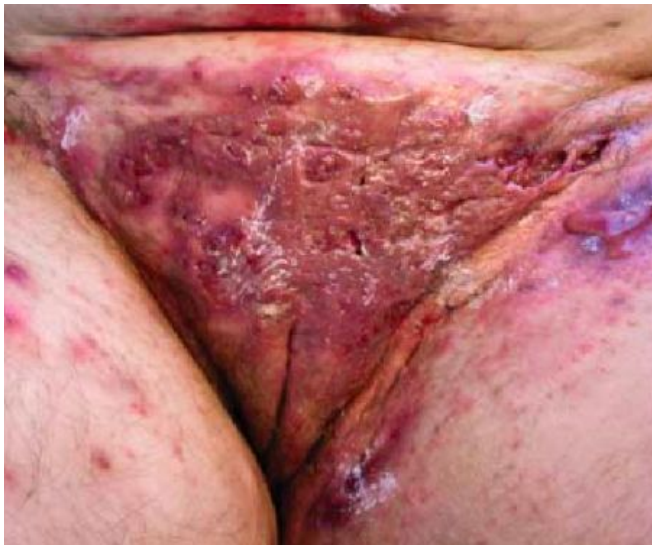
1.2 Pyoderma bound to sweat glands

Hidradenitis suppurativa

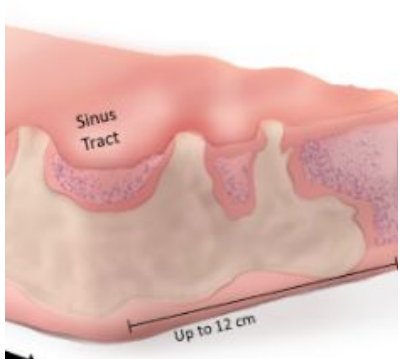
- synonym of acne inversa
- chronic recurrent persistent inflammatory diseases affecting apocrine sweat glands
- massive inflammatory infiltrates and nodules with fistula, purulent secretion, foetor, subsequently with scar
- Areas: Axily, under breasts, perianogenital, inquinas, buttocks
- Subj. significantly painful, with a great impact on the quality of life of patients (eg. development of depression, social isolation, the need for repeated working indentations). HS patients have the lowest quality of life from all skin diseases!







1.2 Pyoderma bound to sweat glands



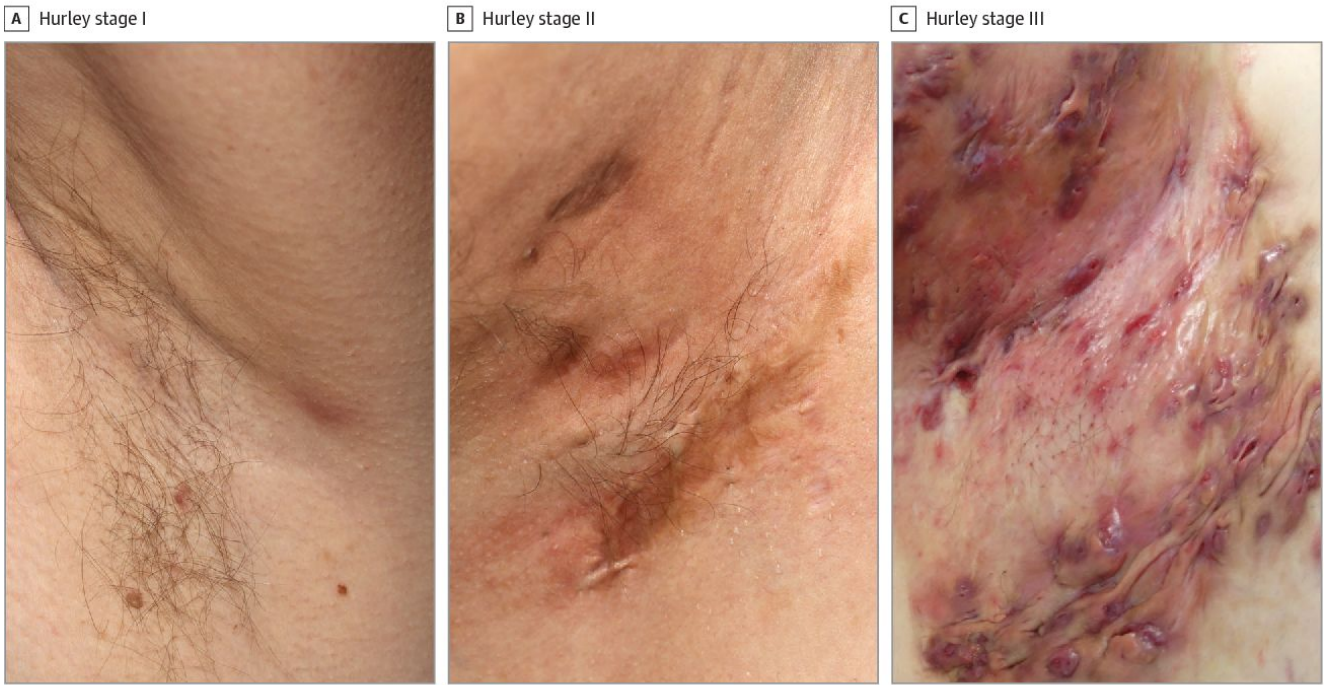
Hidradenitis suppurativa

- women affected 3 times more often
- development depends on several factors: genetic, hormonal, mechanical (skin friction places with garments, larger incidence in obese), smoking associations (smokers have more severe forms because nicotine facilitates follicular occlusion)
- the starting factor is the moment of occlusion in infundibulum of the follicle with its subsequent rupture → development of inflammation and formation of abscess → destruction of the pilosacing unit and its surroundings. Chronic processes lead to scarring, sinusoidal tracts.
- association with autoinflammatory diseases: Colitis ulcerosa, Pyoderma gangraenosum, as well as acne, with abscesses and necks, with scarring alopecia
- Hurley Staging classification (according to I-III Stadium)
- complications of disease is the formation of lymphedema, fistul into neighboring organs
- most common comorbidities: metabolic syndrome (obesity, dyslipidemia, hypertension, glucose metabolism disorder), nicotinism, depression, alcoholism
- therapy: local antibiotics eg clindamycin in gel, systemic antibiotics, eg clindamycin (Dalacin cps), acitretin, surgical therapy, biological therapy anti-TNF preparations = adalimumab

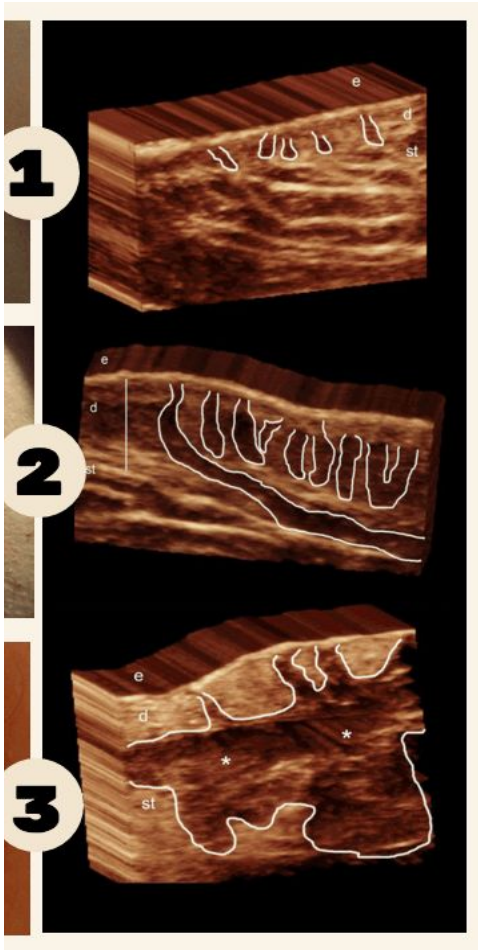
1.2 Pyoderma bound to sweat glands

Hidradenitis suppurativa

- Hurley's classification divides HS on 3 degrees - light, moderate, heavy

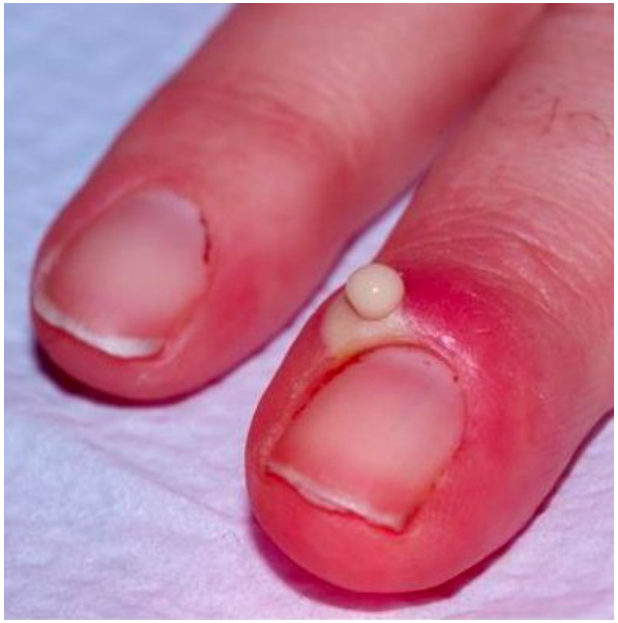


Ultrasound examination



1.3 Pyoderma bound to nail - paronychia

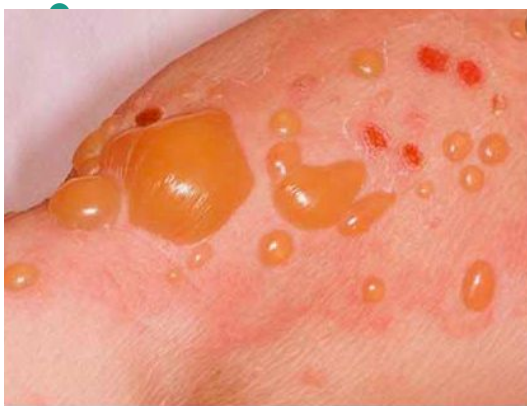
- purulent diseases of nail valves resulting most often after injury (manicure, cracking of the skin from threshold)
- the painful erythema and edema of the nail wall from which the drops of pus can be disappeared
- DIFF DG: Candida infection, Herpes
- therapy: baths in disinfectants (hypermangan), antibiotic ointment

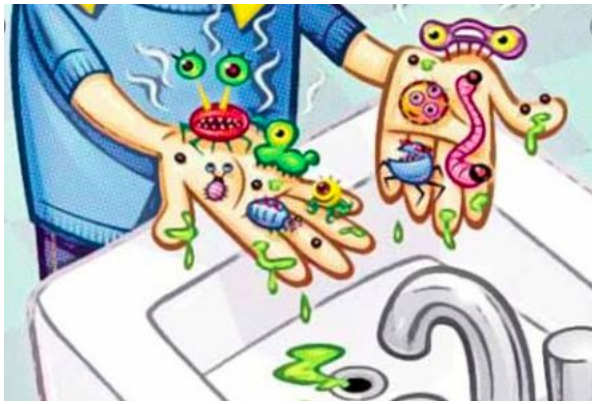


1.4 Superficial pyoderma

Impetigo:

- synonym of impetigo vulgaris, impetigo contagiosa
- frequent surface infection located in sub-portic part of the epidermis affecting children and adults
- transmission is done by direct contact, considerable portability! (children's collectives)
- etiology:
  - Streptococci - maculovesiculous form: red maculovesicle, pustules, cracking forms erythematic bearings, erosion covered with dried secretion in the form of honey crust
  - Staphylococci - bullous form: bula on erythematous bleeding, separating plainly covering red bearings with collar scales on peripherence (face, nasal entrances)
- incubation time in the order of days





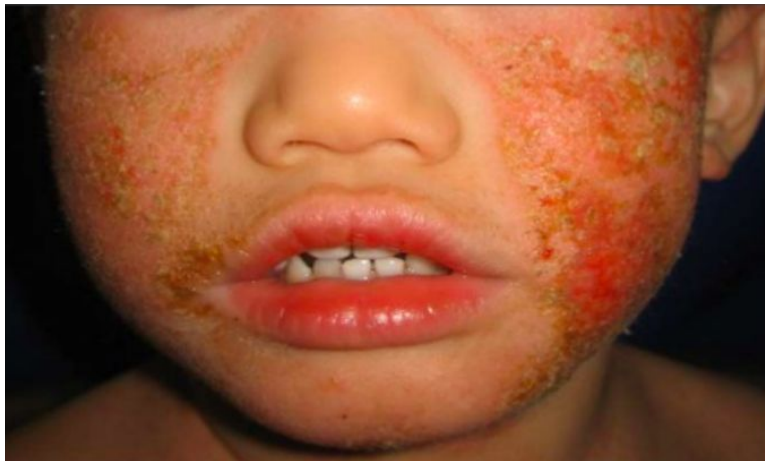
1.4 Superficial pyoderma

Impetigo

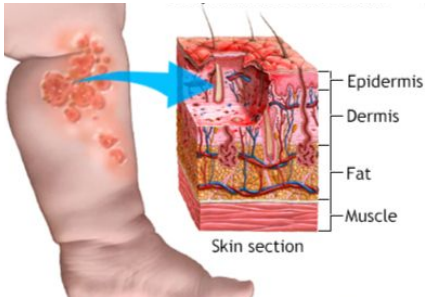
- Therapy: Antiseptic solutions (chlorhexidine), ATB ointment (mupirocin, ac. fusidicum, bacitracin), at a larger ATB extent (PNC, cephalosporins)
- hygiene measures (child collectives!) - not lending a towel, linen, direct contact limitation

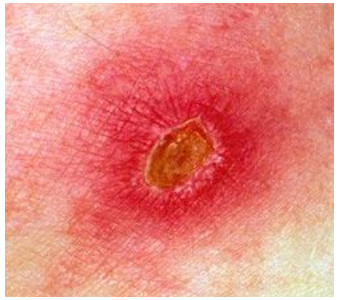
“Impetiginisation”

- secondary infections caused by cocci that complicate any dermatose (eg atopic eczema)
- superinfection in the field of other dermatoses



1.5 Deep pyoderma





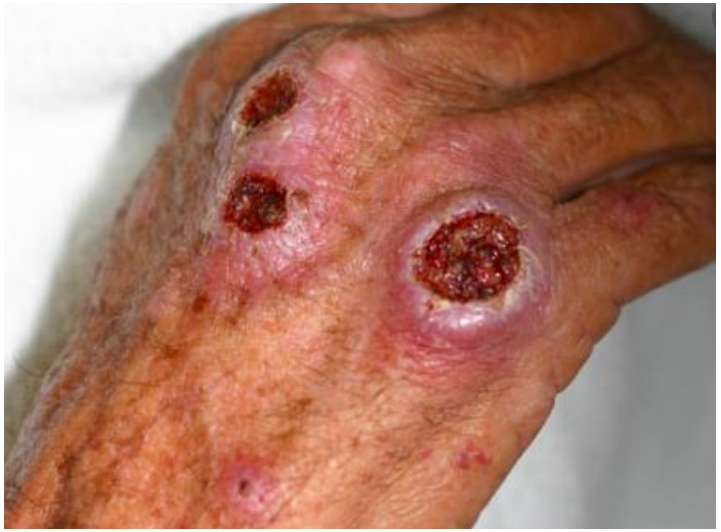
Ecthyma

- ulcerative pyoderma, which often occurs secondarily in places infected by excoriation of itchy dermatoses (eg scabies, insect bites)
- predisposition: malhygiene, immunosuppression, malnutrition
- clinical signs: superficial ulceration with elevated pink/red border, shroud of gray-yellow crust, after the elimination of crust purulent secretion is evident
- heals with scars, therapy is the sme like for impetigo

Impetigo - affects only epidermis

X

Ecthyma - also affects the upper part of dermis



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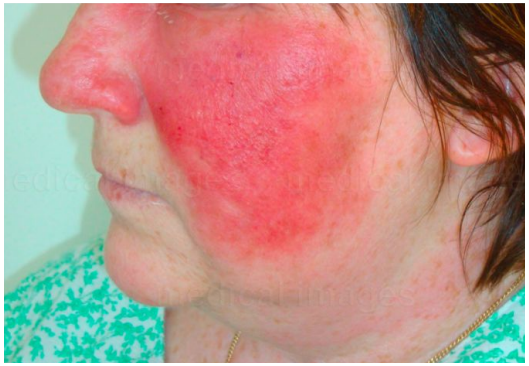
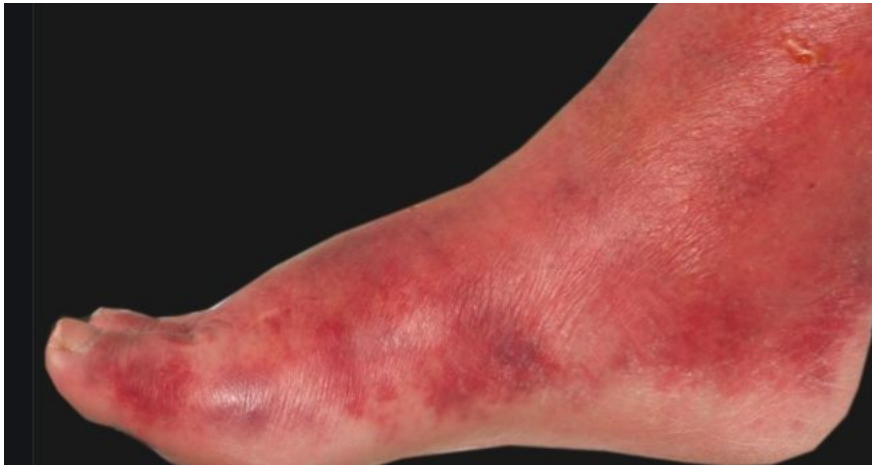
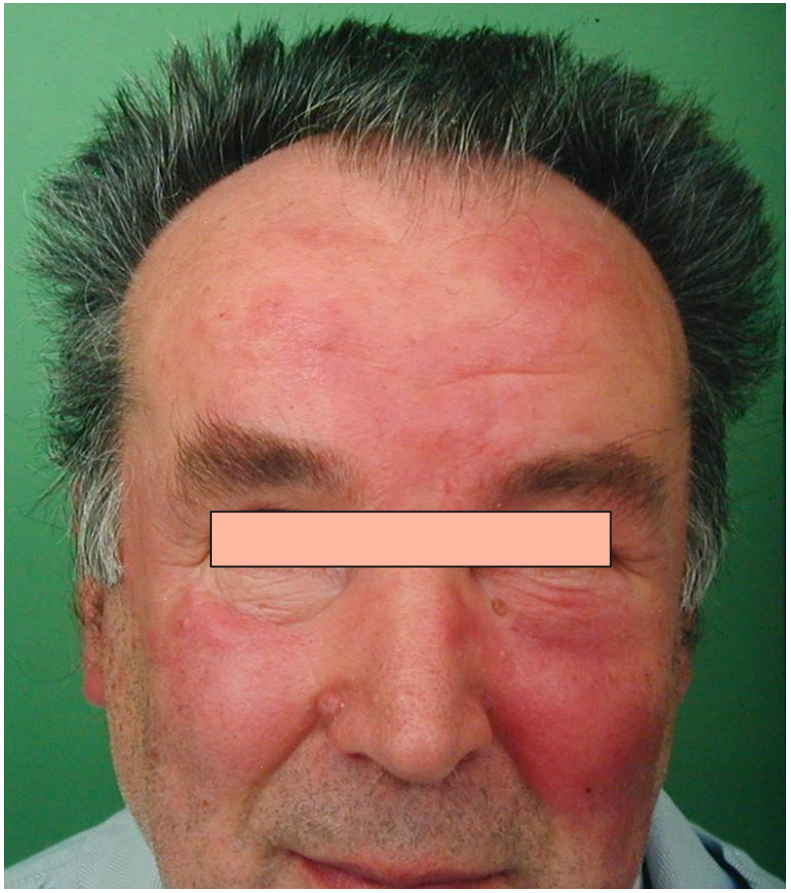
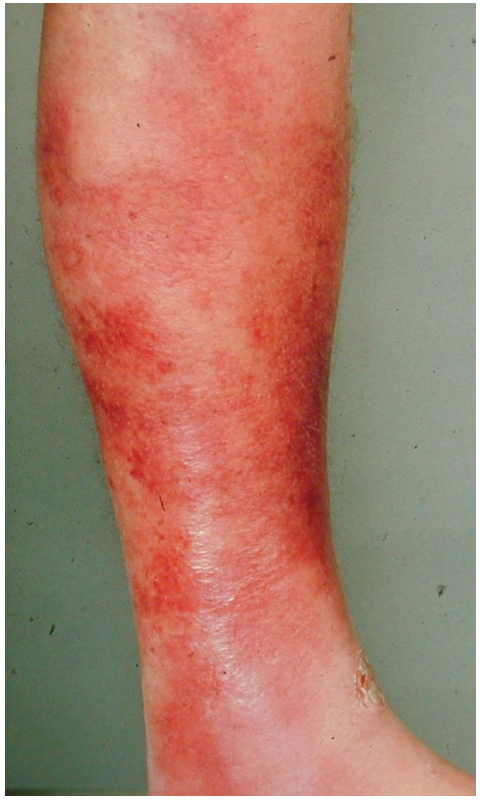


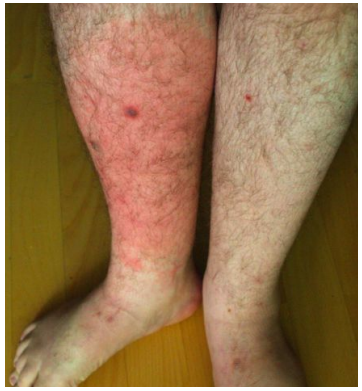
Erysipelas

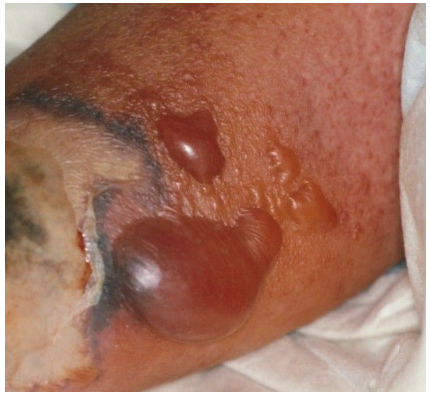
- synonym rose
- acute skin and subcutaneous infections accompanied by systemic symptoms
- relatively frequent, more affects older people, up to 30% recurrence
- etiology: Streptococcus pyogenes (ß-haemolyticus group. A), exceptionally different streptococci, staphylococci
- incubation time from hours to 2 days
- infection spreads due to lymphatic paths, for example: from small injuries, interdigital tinea, from damaged skin at CVI
- risk patients are: obese, pacients with lymphedema and leg ulcers, diabetics
- in 90% affect the lower limbs, in 5% of the upper extremity (typically women after mastectomia from the indication of breast cancer), it can also affect the face, trunk, genital
- clinical picture: a sudden formation beginning with prodroma (chills, fever up to 40 C, shaking, disgust, headache), in a few hours, edema is created in the affected location, sharply bounded with linguistic protrusions towards the periphery. The skin is warm, painful. Regional lymph nodes can be enlarged, with lymphangoitis.
- laboratory elevation of inflammatory parameters (may not be distinctive in geriatric, immunosupposed patients!)

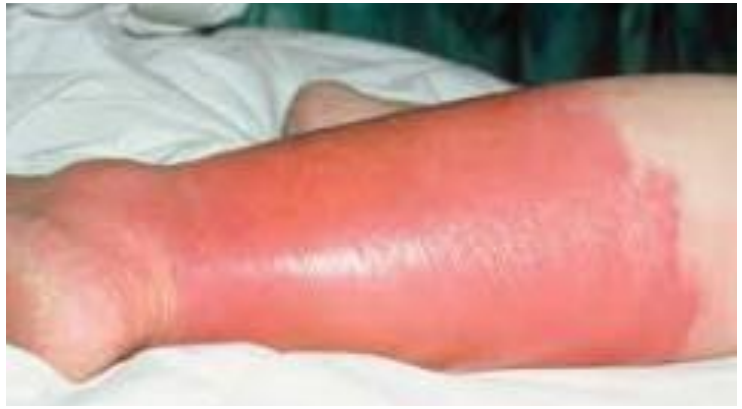












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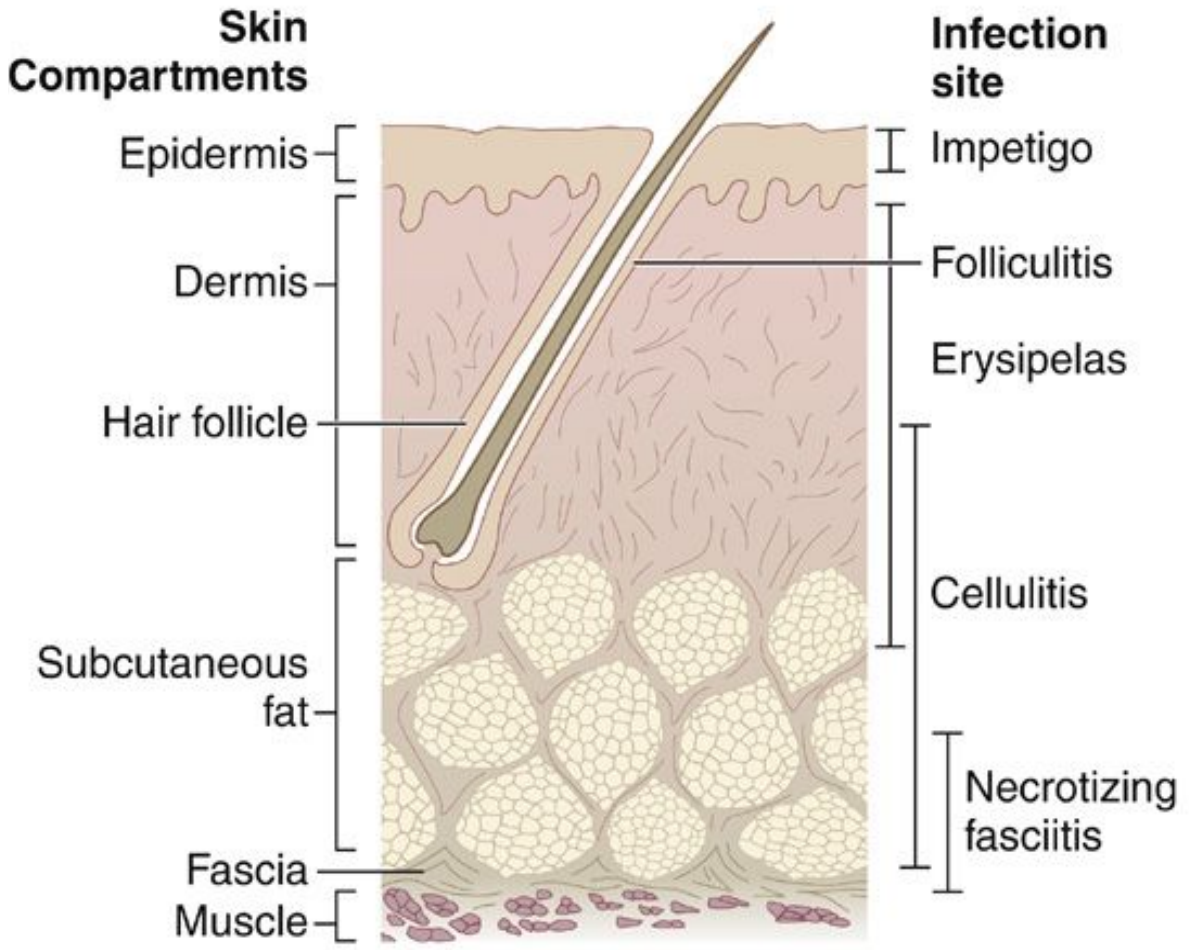


1.5 Deep pyoderma

Erysipelas

- types:
  - bullosum (erosion or ulcer formation after blistering)
  - gangraenosum
  - phlegmonosum
- erysipelas complications:
  - myo / endo / pericarditis, glomerulonephritis
  - fever, tachycardia, tachypnoea, hypotension, oliguria, somnolence, confusion
  - lymphedema (as a result of undergoing especially insufficiently treated erysipelas), in case of recurrences up to the picture of elephantiasis
  - deep vein thrombosis
  - abscess
  - hematogenous dissemination → septic shock
- diff dg: contact dermatitis, DVT !!!, stasis dermatitis, phlegmon
- th: 1st choice drug PENICILIN ATB, cephalosporins
  - 2nd choice for AA on PNC clindamycin / clarithromycin
  - ATB at least 10 days !, elongation in complications, followed by pendeponization - prophylactic aplication of ATB in pac. with relapses, lymphedema, diabetes, obese, woman after mastectomy, according to the frequency of erysipelas and comorbidities - sometimes lifelong!

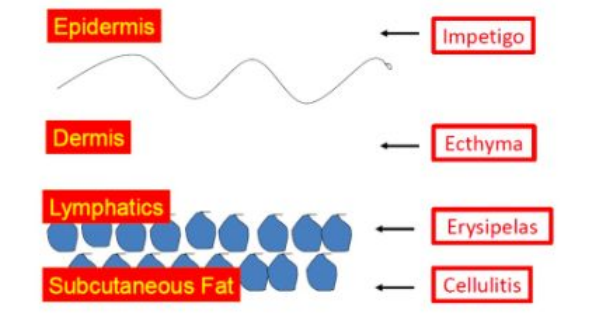
relapses:
systemic symptoms are not so intensely expressed,
as a primary infection
!!!

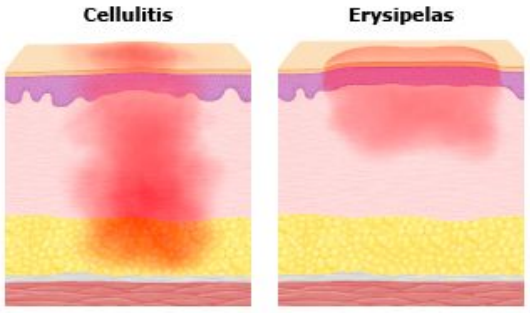
on the other hand, lymphedema is from another causes (eg after mastectomy) often complicated by recurrent erysipelas

1.5 Deep pyoderma

Phlegmon

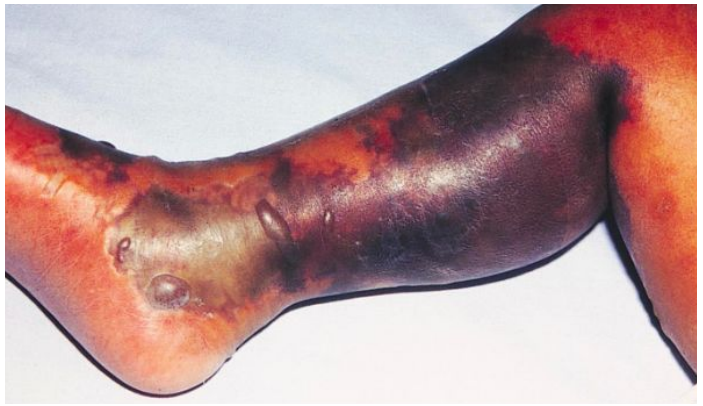
- acute unbounded soft tissue inflammation diffuse spreading in the skin, subcutaneous tissue, along the fascia, tendons, muscles
- on the skin most often arises from minor injuries
- phlegmon of the skin and subcutaneous tissue is referred to as cellulitis
- caused by: St. aureus, streptococcus sk. A, G- bacteria
- clinical picture: flat, warm, severely painful, red to red-violet, spreading edema of the skin and subcutaneous tissue
- in deeper layers, the breakdown of tissues incl. muscle and abscess formation
- general symptoms: fever, sepsis
- th: high doses of broad-spectrum ATB iv, early surgical incision and drainage



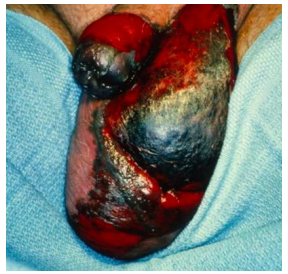


Myonecrosis = muscle necrosis, gas scabies - necrotizing infection of muscle tissue caused by toxins produced by Clostridium perfringens, less K. septicum, novyi. Significant swelling, pain, crepitation. MR examination shows gas in the muscles. High martality!

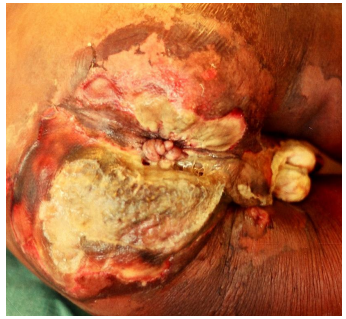
1.5 Deep pyoderma



Necrotizing fasciitis



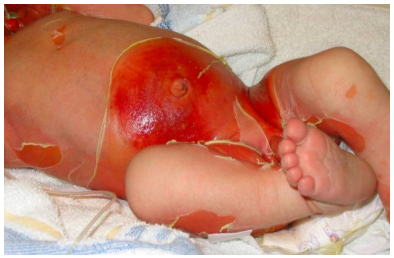
- rare, acute, rapidly progressing deep inflammation of adipose tissue,
  fascia and soft tissues with the formation of blisters, ulcerations, extensive necrosis,
  with severe general symptoms
- risk factors: DM, alcoholism, drug abuse, peripheral vascular involvement
- most often affects the limbs, perineum, abdomen
- in the area of the genitals and perineum, especially of men, is referred to as Fournier's gangrene
- etiology: polymicrobial - Streptococcus ß-haemolyticus group A - action of its exotoxins, St. aureus, Proteus, Clostridium, E. Coli, Pseudomonas, aerobes, anaerobes ..
- disease often begins after trauma, surgery as a rapidly developing severely painful, indurated erythema, edema. Within 36 hours, the color changes to dark red, dark blue.
- the overall condition is significantly altered! threatens to transition to STS!
- th: early and extensive surgical removal of necrotic tissue, ATB iv - megadoses of PNC,
  clindamycin, ev limb amputation. Without th. up to 100% mortality!
- complications: loss of sensitivity from destruction of nerve endings, DIC, septic emboli



1.6 Toxin-induced syndromes

Staphylococcal scalded skin **toxins of St. aureus**

- syn. dermatitis exfoliativa staphylogenes, staphylogenic toxic epidermal necrolysis, Ritter's sy
- severe, life-threatening illness with general symptoms, rapid progression within hours!
- macular exanthema → large bulla → separation of the upper parts of the epidermis in large areas skin surface conditions caused by staphylococcal exotoxins (exfoliatins), especially in infants and children under 5 years of age. No mucosal involvement.
- positive Nikolsky phenomenon, cave: sepsis, pneumonia, mtb desintegration
- th: ATB-resistant ß-lactamase: aminopenicillin - oxacillin, cephalosporin



Toxic shock syndromes **St. aureus and ß-hem. streptococci group A**

- rare shock with fever, hypotension, skin symptomatology, multiorgan involvement
- scarlatiniform macular exanthema to erythroderma → after 1-2 weeks of desquamation, especially soles, mucosal involvement (raspberry tongue, erythema / swelling / mucosal erosion), cave sepsis, ARDS, DIC, it can be lethal!
- source: surgical wounds, pharyngitis, burns, menstrual tampons (epidemic in the USA in 1980))
- th: early ATB oxacillin + clindamycin, internal care

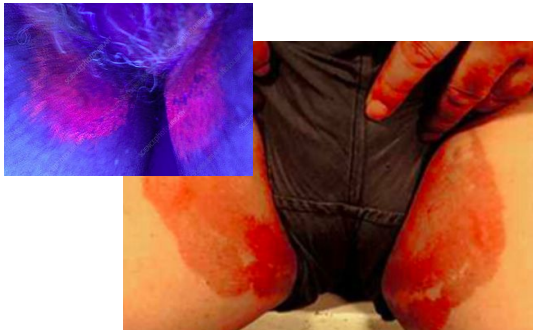
Scarlatina **ß-hem. streptococcus group A**

- syn. Scarlet fever, tonsillitis with fever accompanied by small macular rash ("goosebumps"), raspberry tongue, facial erythema, Filatov's symptom (perioral fading), Šrámek's symptom (papules of nail walls), Pastia's lines (linear petechia in kubits, flexurs), 1-2 week later lamellar skin peeling, th: PNC, clarithromycin, cephalosporin, clindamycin

2. Skin infections caused by corynebacteria

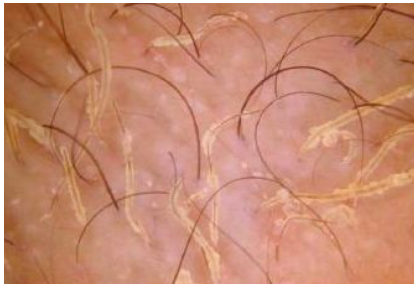
Erythrasma

- causative agent Corynebacterium minutissimum producing porphyrin → coral red fluorescence beneficial in diagnostics in Wood's lamp
- superficial skin infection, sharply demarcated brownish-red macules to areas with fine scaling, affecting the axillae and groin
- predisposing factors: obesity, hyperhidrosis, diabetes, airtight clothing, hot climate



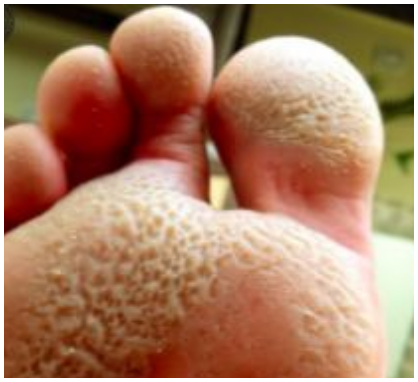
Trichomycosis axillaris, syn. palmellina

- causative agent Corynebacterium tenuis → yellow fluorescence useful in diagnostics in Wood's lamp
- adhering yellowish deposits on the hair of the axils, rarely pubic areas, causing thickening of hair stem and forming irregularly distributed nodules along the hair, which are formed by bacteria coated with an amorphous matrix, acid odor, red sweat
- predisposing factors: hyperhidrosis, wet and warm operations



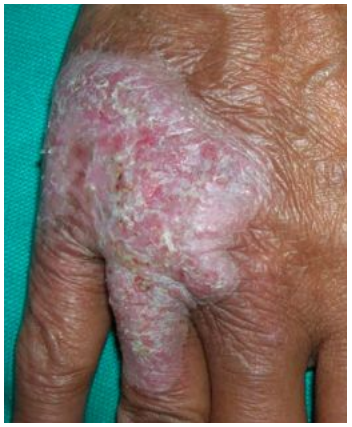
Keratoma sulcatum, syn. pitted keratolysis, keratolysis sulcata

- the causative agent of Corynebacterium species, ev in combination with others
- predisposing factors: hyperhidrosis, occlusion, closed shoes
- pitting, clinically in the field of macerated smelly hard skin patches of plantae, ev palm, small 1-5mm large holes (foveoli, fovey), confluent lesions



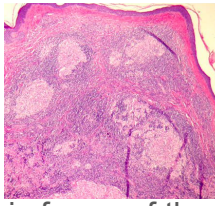
th: local ATB (erythromycin, clindamycin, mupirocin, fucidic acid), ev systemic ATB (doxycycline, macrolides), in trichomycosis shaving hair, in keratoma sulcatum also drying area, keratolytics, preventive hygiene measures

3. Mycobacteriosis



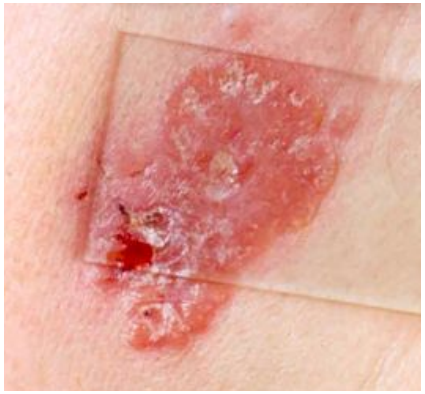
Cutaneous tuberculosis, syn. tuberculosis cutis

- cutaneous forms of tuberculosis form chronic specific granulomatous inflammation of the skin
- the causative agent is **Mycobacterium tuberculosis (Koch's bacillus),** an acid-resistant rod
- skin forms of tuberculosis in the Czech Republic: dozens of cases per year (increase is a response to migration, drug abuse, AIDS, increased number of immunosuppressed patients, diabetics, anti-TNFalpha therapy)
- comprehensive vaccination against tuberculosis was abolished in the Czech Republic in 11/2010 and remained mandatory only for high-risk children
- dg. clinical signs, histolopathological examination with the finding of specific caseifiers granulomas, cultivation, PCR, Quantiferon Gold test, T-SPOT



- therapy:
  - treatment of cutaneous forms of tuberculosis corresponds to the treatment of systemic forms of the disease
  - must respect certain rules: never treat for less than 6 months and never with monotherapy, but always with a combination of medicines
  - initially 8 weeks combination of 4 chemotherapeutics (ISONIAZIDE + RIFAMPICIN + ETHAMBUTOL + PYRAZINAMIDE)
  - continued therapy for 18 weeks with combination of 2 chemotherapeutic agents (ISONIAZIDE + RIFAMPICIN)

3. Mycobacteriosis

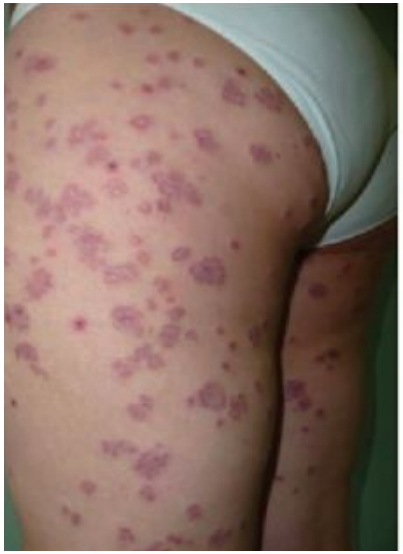
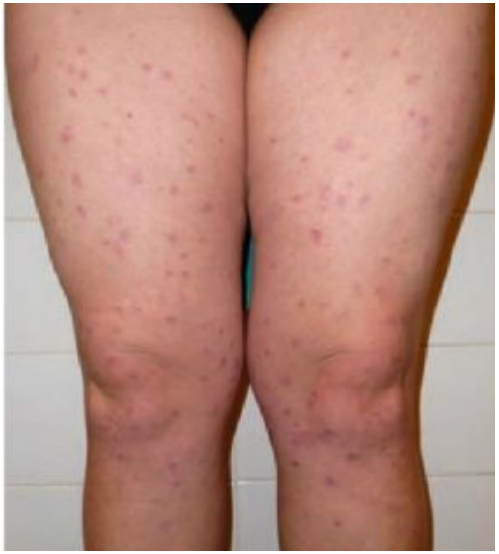
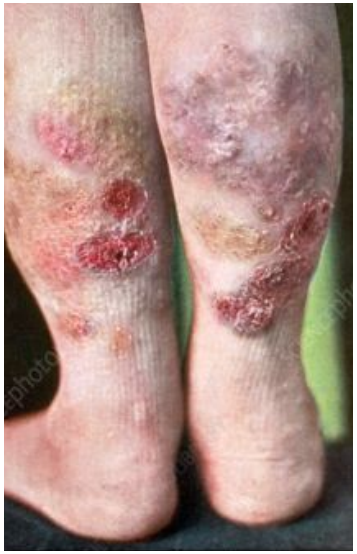


Clinical forms of cutaneous tuberculosis:

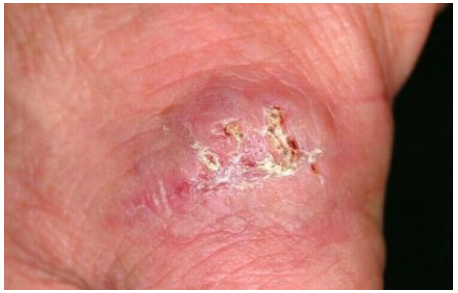
- **Primary inoculation tuberculosis, syn. tbc chancre** *(in an individual who has not yet encountered tbc, a clinically indurated nodule, ulcus, which together with an enlarged regional lymph node forms so-called “primary complex”)*
- **Tuberculosis cutis verrucosa** *(for persons in the past infected, who have medium / high immunity, most often warty papule / plaque on the hands, veterinarians - bovine type, autopsy staff - human type)*
- **Lupus vulgaris, syn. tbc cutis luposa** *(most common form, people with medium / high immunity, red-brown plaques, bumps, areas, larger head and neck, destructive course - ulceration, scarring, destruction of cartilage, cave spinalioma in chronic untreated foci - “carcinoma in lupo”, vitropresse - "apple jelly")*
- **Scrophuloderma, syn. tbc coliquativa** *(spreading per continuity from caseified tbc lymph nodes, bones, mostly on the neck: induration over an enlarged, skin-fixed node, which, when rolled on the skin surface, produces ulcerations, fistulas, sinuses, accompanied by secretion)*
- **Tuberculosis cutis ulcerosa, syn. tbc cutis vera, tbc orificialis** *(involvement of skin around mucous membranes, formation of autoinoculations in tbc internal organs - lungs, GIT, URG. Clinical ulcers around the mouth in tbc lungs, involvement of vulva and penis in tbc of URG tract, perianal area in tbc of GIT)*
- **Tuberculosis cutis miliaris** *(rare generalized form with papule formation, ulceration, hematogenous dissemination)*
- **Tuberculous gumma, syn. metastatic tuberculosis abscess** *(hematogenous distribution of BK from primary lesion, clinical ulcer, sinuses)*
- **Adverse reactions for BCG vaccination** *(very rare, non-specific ulcers, abscesses, rash / specific manifestations)*

3. Mycobacteriosis

- Tuberculids
  - in contrast to the active forms of tuberculosis, they represent skin changes arising as a late allergic response of the organism to the hematogenous distribution of BK antigens into the skin
  - these are called -id reactions
  - non-infectious, recurrent, disseminated, symmetrical rashes
  - include: Lichen scrophulosorum, Papulonecrotic tuberculid, Erythema induratum Bazin

3. Mycobacteriosis

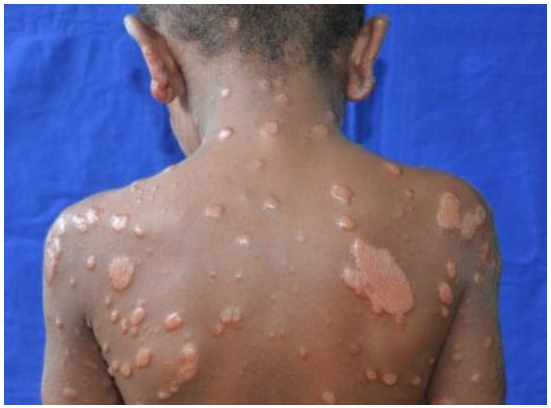


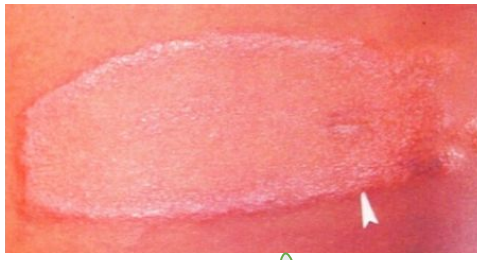
Atypical mycobacteriosis

- ulcerative and granulomatous processes, abscesses, sometimes associated with lymphadenitis
- caused by mycobacteria other than M. tuberculosis and M. leprae
- widespread worldwide in water and soil (M. ulcerans tropics + subtropics)
- skin changes in microtraumas, after chir procedures, after injections
- in immunocompetent individuals, they cause localized infections at the site of inoculation
- immunosuppressed individuals are at risk of dissemination
- representatives: M. MARINUM, KANSASII, SCROFULACEUM, FORTUITUM, CHELONAE, ULCERANS
- **Granuloma from swimming pools**
  - after injury during contact with water in pools, water areas, in aquarium workers
  - M. marinum
  - mostly on hands and feet: nodules, ulcerations
  - th: empirically clarithromycin for 2 months, in case of resistance: antituberculotic th.

3. Mycobacteriosis

Leprosy

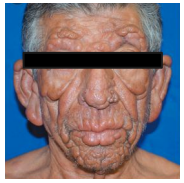




- chronic granulomatous infection affecting the skin and nerves
- the causative agent is Mycobacterium leprae
- equatorial regions of Asia, Africa, South America, the influence of malhygiene, poverty, lack of health services
- air transmission from nasal secretions of patients with lepromatous leprosy, incubation period of up to 30 years!

Klinical picture:

- early stage = leprosy indeterminata (hypopigmented macules, decreased skin sensitivity)
- furthermore, it develops one form (depending on the quality of cellular immunity): there are 2 borderline forms (I. tuberculoid + I. lepromatosis) and between them a number of transient states
  - **tuberculoid form**: with good immunity, small amount of bacteria, clin. solitary hypopigmentations, decreased sensitivity, loss of adnexa, everywhere except the face, localized disability
  - **borderline** = transition between them: signs of both, either regress to TL or progress to LL
  - **lepromatous form:** in case of poor immunity, generalized form, in addition to skin involvement and NS also of the kidney, RS, many bacteria in the body, papules and nodules of red color, enlargement and , confusion, severe involvement perif. nerves, diffuse infiltrate dermis with loss of adnexa - lion face "facies leontina"

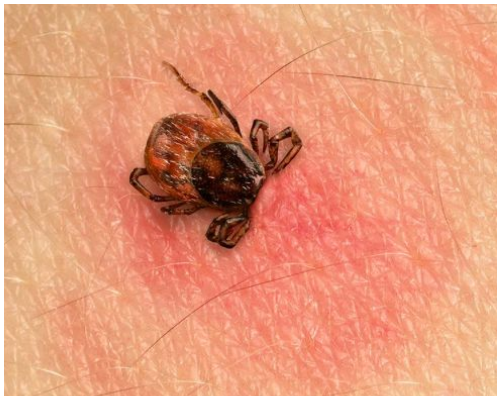


Diagnostic: clinic, neurological higher, baculoscopy, PCR, histopathology, direct identification by Fite-Faraco coloration

Therapy: rifampicin + ofloxacin + minocycline, rifampicin + dapsone

4. Boreliosis

- syn. Lyme disease
- frequent anthropozoonosis, around 4,000 patients are reported annually in the Czech Republic
- systemic infectious disease caused by Borrelia burgdorferi sensu lato complex, transmitted in Europe by the tick Ixodes ricinus (longer sucking time, up to 48 hours, required for development)
- clinically it is most often manifested by cutaneous manifestations, systemic manifestations can be neurological, cardiovascular, rheumatic, ocular, etc.
- reservoir rodents, small mammals, deer, pets, birds
- only 5% of people develop the disease as a result of sucking, of which 3% elevate antibodies, 2% manifest the disease. In others, the infection occurs inapparently
- incubation period usually 7-14 days, manifestation of skin involvement in 80-90%, other organs in 10-20%



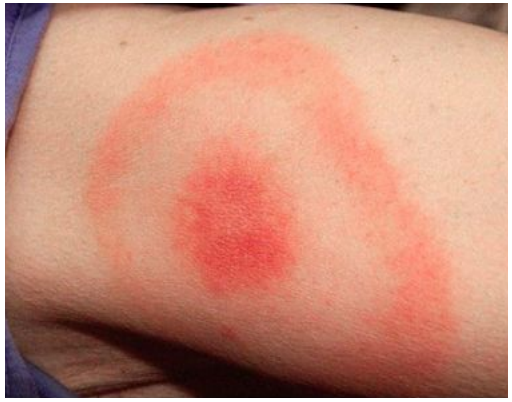
4. Boreliosis - clinical course

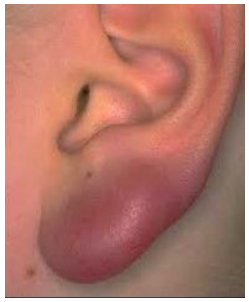
Stage of LD	Skin symptoms	Systemic symptoms
early localized infection	erythema migrans boreliový lymfocytom	
early disseminated infection	erythemata migrantia multipl. boreliový lymfocytom	nespecifické příznaky připomínající chřipku neuroborelióza • lymfocytární meningitida • meningoradikulitida • kraniální neuritida • myelitida oční postižení • konjunktivitida, fotofobie • iridocyklitida, uveitida, virtitida, diplegia, choroiditida, makulární edém, edém disku, optická neuritida a neuroretinitida myozitida kardiální postižení • akutní karditida • AV blok • dilatační kardiomyopatie akutní intermitentní monoartritida
late infection	acrodermatitis chronica atrophicans	periferní neuropatie asociovaná s ACA chronická artritida chronická encefalomyelitida cerebrální vaskulitida keratitida, episkleritida, orbitální myozitida

4. Boreliosis - early localized infection

Erythema migrans

- red smooth annular macula larger than 5 cm in diameter, forming at the site of tick attachment
- most often places of thin skin - on the HD of the hamstring, children upper half of the chest and face
- asymptomatic or slightly itchy, palpably warmer than the surroundings
- 3 main types:
  - EM anulare
  - EM maculosum
  - EM concentricum
- other less common variants:
  - EM infiltrative
  - EM lividum
  - EM vesiculosum
  - EM haemorrhagica
  - EM irregular
  - EM invisible
- usually solitary, exceptionally multiple after ticking in ticks in multiple places
- without ATB th borrelia in the skin can persist and spread to other organs
- if the EM persists more than 4 weeks, it is called **Erythema chronicum migrans**





Note if redness up to 1 cm appears in the area where the tick sucks, it is morsus insecti.

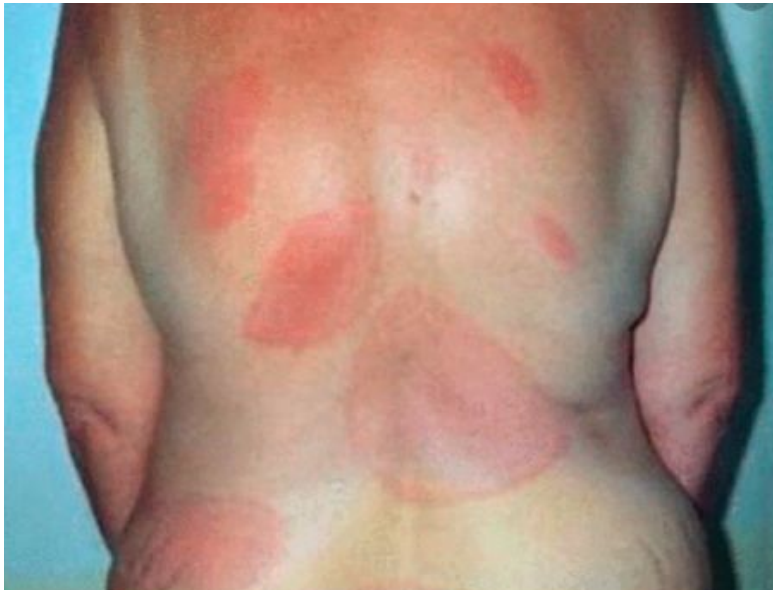
Suitable pac. invite in 7-10 days to check whether ev. image EM.

Lymphocytoma borreliensis - at the site of tick attachment, on the skin and simultaneously present with EM, typically in children, the types of BL papulosa, infiltrative, typical localities are the auricles, the areola, scrotum and nose.

4. Boreliosis - early disseminated infection

Hematogenous dissemination of Borrelia results in the development of an early disseminated stage with various systemic symptoms. They can be simultaneously with the skin or combined. The most common are flu symptoms - subfebrile, arthralgia, myalgia, headache, lymphadenopathy, symptoms of NS and cardiovascular disorders.

Skin manifestations are disseminated erythemata migrantia - the formation of EM, which is followed by smaller spots in a week.



4. Boreliosis - chronic skin manifestations

It develops over months and years, especially in people who are repeatedly in contact with ticks (hunters, farmers, athletes, dog owners).

The cutaneous manifestation is **Acrodermatitis chronica atrophicans**. It is often accompanied by peripheral neuropathy, chronic arthritis. It takes place in 2 phases - inflammatory and atrophic.

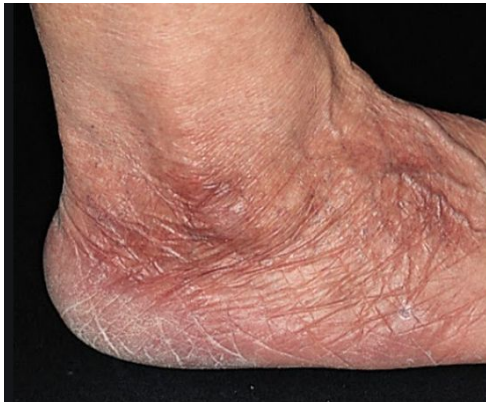
During the **inflammatory phase**, the acral dark red is irregular erythema, sharply demarcated, accompanied by swelling. Typically on the dorsolateral parts of the hands and feet, above the elbows and knees, especially above the joints and bone prominences.

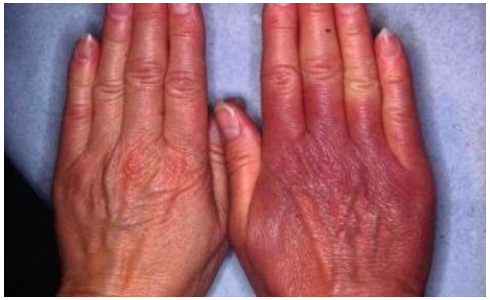
In the **atrophic phase**, the lesion is the hardest to recognize, it has 3 clinical forms: telangiectatic, fibrous, atrophic.

Complications: neuroborreliosis, rheumatic symptoms, cardiac symptoms, eye symptoms.

Diagnosis: it is clinical, a history of tick bites, serology of Borrelia (increased levels alone are not enough for diagnosis !!!), histopathological higher. in BL, ACA.

Prevention: vaccination does not exist, application of repellents, search for ticks, showering after staying outside, early removal of ticks after disinfection by twisting with tweezers.





4. Boreliosis - therapy

Initiation as soon as possible based on the clinical picture. No serological examination is required.

Systemic treatment use 4 groups of ATBs: the drug of the first choice DOXYCYKLIN 200mgD orally, then event. AMOXICILIN / PHENOXYMETHYLPENICILIN, MACROLIDE.

The duration of treatment should not be less than 2 weeks, for chronic infection 4 weeks. Prolongation of th. has no justification. Similarly, elevated levels of antiborreliosis antibodies are not treated without further clinical signs of disease.

Neuroborreliosis - ceftriaxone iv.

Amoxicillin, penicillin G, ceftriaxone can be given during pregnancy.

Children under 9 years of age are not given TTC ATB.

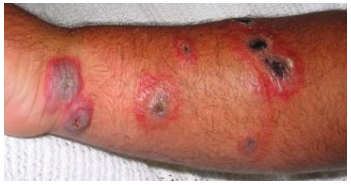
Treatment may initially be accompanied by Jarish-Herxheimer reaction from bacterial breakdown (similar to syphilis treatment).

5. Anthropozoonoses

- diseases caused by microorganisms transmitted from animals to humans

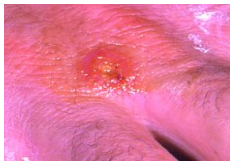
- **Anthrax, syn. pustula maligna, spleenwort, charcoal**

  Bacilus anthracis, a major acute disease of cattle transmissible to humans, cutaneous, pulmonary, intestinal, transmission by treatment of sick animals, processing of their meat, skin, bones. Papules, pustules, ulceration, general symptoms.



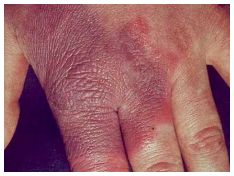
- **Tularemia, syn. rabbit disease**

  Francisella tularensis, infectious dis. of rodents, worldwide, entry into the organism: RS, GIT, conjunctiva, skin, forms: ulceroglandular, (injury results in papule, ulceracereg. lymphadenopathy), mucosal, typhoid, oculoglandular



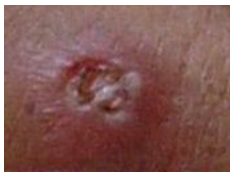
- **Erysipeloid**

  Erysipelothrix rhusiopathiae, acute inflammation of the skin of the fingers, after injury in persons handling fresh fish, poultry, meat, in our country most pigs, occupational disease (butchers, slaughterhouse workers), warm painful red-violet phlegmon-like lesion, does not ulcerate, temperature, nausea, lymphadenopathy.



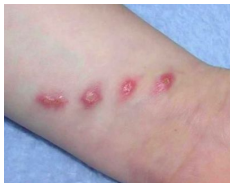
- **Malleus, syn. glanders**

  Burkholderia mallei, rare disease of ungulates, infection of humans by contact, pustula, phlegmon, ulcer, acute form with general symptoms, multiple lesions, including mucosal involvement, chronic form - abscesses, ulcers, lymphadenopathy.

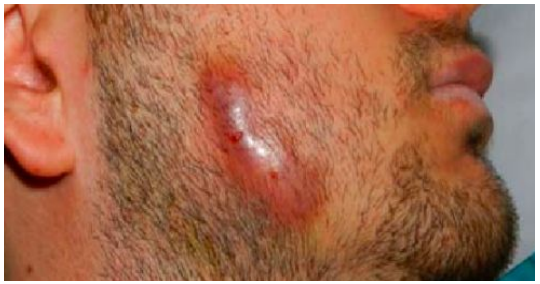


- **Cat scratch disease**

  Bartonella henselae, rare chronic infection, lymphadenopathy, after injury and contact with a cat, especially in children, papule, vesicle, general symptoms, rare form of oculoglandular (Parinaud's sy)



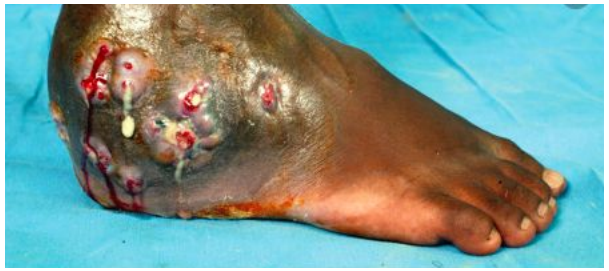
6. Actinomycosis

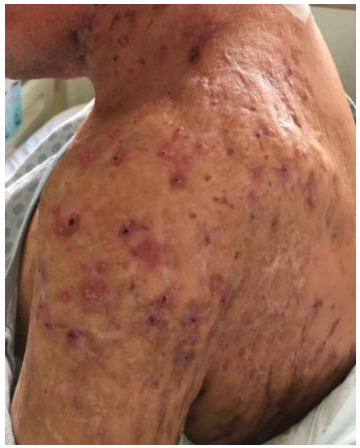


- chronic granulomatous disease accompanied by the formation of abscesses, fistulas, scars
- occurrence worldwide, more in men
- caused by several species of G + bacteria of the genus Actinomyces, most often A. israeli, which are commensals of the oropharynx, genital
- a prerequisite for the development of the disease is an injury to the mucosa, most often the mouth
- clinical: solid, planar inflammatory infiltrates with rolling edges, from which the purulent content can be extruded
- the most common localization is the face and neck - cervicofacial form, then thoracic (penetration of the causative agent into the lungs) and abdominal form (the entrance gate is the intestine)
- dg. clinical signs, macroscopic and microscopic finding of sulfur granules (conglomerates of bacteria - druse), cultivation
- th. penicillin G, ampicillin given for several weeks, surgical treatment

Other rarer units:

Actinomycotic granuloma
Bacillary angiomatosis
Bartonellosis
Nocardiosis
Diphtheria
Listeriosis
Clostridial infections





Thank you for your attention