Term	Topic content
Epidemiology	In economically developed countries the patients with pyoderma compose 1/3 of patients, suffering from infectious diseases. The morbidity rate in children is higher than in adults, it composes 25-60% of the total number of cases of dermatoses. Pyoderma is the most common among the worker of such industries as metalworking, metal mining, coal mining, timber manufacturing, transportation, and various branches of agriculture as well.
Etiology	Most frequently the agents of pyoderma are staphylococcus and streptococcus. Different types of pustular skin diseases can occur initially as separate nosologic entities or as a complication of other dermatoses (scabies, eczema, atopic dermatitis etc.). Staphylococci under the microscope have got rather correct round shape (their accumulations are often similar to a bunch of grapes) with a diameter of about 0.8-0.9 microns. The most virulent is Staphylococcus aureus. Staphylococci are also presented in form of spherical formations, joining in long chains. The diameter of one coccus varies from 0.5 to 1 micron. Pycocci occur on the skin in the form of avirulent microorganisms in 90-92% of healthy people, and it is possible to detect their pathogenic forms only in 8-10% of population. Saprophytes can acquire pathogenicity under certain conditions and their virulence can increase under the action of alkaline reaction of the skin or in case of joining of other agents, such as fungi. In case of Gram-stained pus smear, both staphylococci and streptococci are well stained in blue that means they are Gram-positive. The toxins, released by pyococcy, are highly toxic and are capable to lyse erythrocytes, leukocytes.
Pathonesis	Virulence of pyococci plays an important role in the occurrence of pyoderma. A number of factors, such as the acid reaction of the horny layer of epidermis, sebaceous glands, enzymatic activity of the skin etc., counteract the increased virulence of staphylococci and streptococci. A number of exogenous and endogenous factors contribute to the development of pustular lesions of skin. The most frequent exogenous factors include the excessive skin contamination with gasoline, oil, dust particles (coal, cement and other), micro injuries (insect bites, excoriations, needlesticks and other), maceration of homy layer (long dish-washing,

	doing laundry), hypothermia and hyperthermia. The endogenous factors, contributing to the development of pyoderma, are low- calorie food, hypovitaminosis, chronic debilitating diseases, intoxications (alcoholism,narcomania), physical and nervous strains, diabetes, immunodeficiency etc. There is no innate immunity against the pyococcus infections, but unstable infectious immunity can appear in the course of pyoderma, the intensity of which varies in wide range. The frequent for pustular diseases are the allergic reactions appearing in the result of sensitization to metabolic products of their agents, whereof the positive intracutaneous tests with the corresponding allergens (vaccines) indirectly testify. The character of pyoderma development in clinical respect depends on the place of influence of agent. Staphylococci more often affect hair follicles, whereas streptococci mainly parasitize on the smooth skin. Favorite localization of panaritium, for example, is periungual walls, of ectymas is shins, furuncles and carbuncles are more common on the buttocks, lower back etc. Besides pyococci, the pustular skin lesions can be caused also by collibacillus, proteus vulgaris, fungi, pseudomonas aeruginosa, pneumococci etc. Depending on the agent, pyodermae are divided into staphylococcus,streptococcus and mixed; depending on the deepness of lesion they can be superficial and deep, on the character of the course they are acute and chronic, on the origin they are primary and secondary.
Streptococcal infections of skin – streptoderma	**Streptoderma** are caused by streptococci, which unlike staphylococci, do not affect pilosebaceous apparatus and sweat glands and do not infect derma and subcutaneous fat with the following development of necrosis. Streptococci mainly cover the smooth skin, and the diseases caused by them are of superficial character and in majority of cases manifest as elements in the form of blisters or phlyctenas, filled with clear or slightly nebulous contents. Most frequently, streptodermae are observed in women and children due to the fact that their skin is more delicate. The following forms of streptodermae are distinguished, these are streptococcal impetigo, streptococcal intertrigo, syphiloid

	papular impetigo, superficial panaritium, perleche, lichen simplex, ecthyma vulgaris, and superficial chronic diffuse streptoderma. ***Streptococcal impetigo*** *(impetigo streptogenes)* is caused by streptococcus and localized mainly on the face, extremities, sometimes on the trunk. In the pathogenesis of streptococcal impetigo the skin injuries are of certain importance, as well as its unhygienic conditions, metabolic disorder, reduced immunological reactivity. Impetigo is especially common in children. The blisters or phlyctenas with the size of a pea to a nut, not stressed and filled with serous or slightly nebulous liquid appear on the hyperemic, lightly swollen skin, and rapidly increase in size. There is a hyperemic circle on the periphery of phlyctenas. Phlyctenas quickly erode (during the period of several hours) and are covered with thin straw-yellow crust. After the falling of crust away, the pink spot remains and after some time it disappears without any trace. A patient suffers from itching, which sometimes can become intense. In some cases regional lymphadenitis can develop. Phlyctenas are located independently, but sometimes they can merge due to peripheral growth, forming arcs, rings, garlands (ring-shaped impetigo). Streptococcal impetigo has benign course and it ends in full recovery after 7-8 days. ***Intertriginous streptoderma,*** or ***streptococcal inertrigo*** *(intertrigo streptogenes)* is mostly observed in children, especially overfed children, with excessive sweating and gastrointestinal disorders. In the pathogenesis of the disease the dermatoses, accompanied by itching, and diabetes are also important. Intertriginous streptoderma is localized in the skin folds, such as inguinal-scrotal, gluteal, in axillary cavities, behind the ears, under the breasts in women, and in the folds of the abdomen in obese people. This disease is characterized by the appearance of erosive wet surface of bright pink colour, strictly bounded from the adjacent skin and surrounded by epidermal collarette. In the depth of the folds the bleeding folds appear. Subjectively, the patients notice itching and burning sensation. It is possible to notice at the close skin sites the pustules at

different stages of development. The disease has long-term course.

Syphiloid papulose impetigo *(impetigo papulata syphiloides)* develops predominantly in infants and is localized on the buttocks, posterior surface of femora and lower legs. On the hyperemic surface the phlyctenas appear, at the base of which there is papulous infiltrate. Phlyctenas erode very quickly, leaving erosive papules. Clinically the disease is analogous to papulo-erosive syphilide. For differential diagnostics it is necessary to carry out the analysis of erosion discharge for the presence of treponema pallidum, and serological study of the patient as well.

Hystologically, in all forms of streptococcal impetigo there is formation of cavity under the homy layer of epidermis. The cavity is filled with serous exudate with some amount of neutrophilic leukocytes and separate epithelial cells. Spongiosis occurs in the spinous layer of epidermis. Vascular distention with perivascular infiltrate, consisting of neutrophils and lymphocytes, occurs in derma.

Superficial panaritium, is predominantly observed in adults. The phlyctenas appears on the hands around the nail plates, which contain at the beginning serous, and then nebulous purulent discharge. The disease is associated with injuries of the fingers, burrs, which create favorable conditions for the penetration of streptococci. The affected phalanx of a finger swells and hurts.

After breaking of phlyctena there appears erosion, covering the nail wall like horseshoe. The process can lead to the rejection of nail plate. Sometimes there are lymphangitis, general uneasiness and fever.

Angular impetigo *(angulus infectiosus)* is characterized by the appearance of linear phlyctenas at the corners of the mouth, which quickly erode, and the cracks appear on their place, which are especially painful when the mouth is opened. The disease can be localized in the corners of the eyes, in the places of adhesion of ear conches. On the skin around the crack of the angle of mouth there appear melichrous crusts, and maceration of epidermis on the edges of the cracks. The contributing factors to the perleches development are

	frequent lips licking, dental prostheses wearing, i.e. maceration of the corners of the mouth sites with saliva. The patients complain about itch, pain while eating. Angular impetigo should be differentiated with yeast affection of the corners of mouth, in case of which the process is not so vivid and there are no crusts. It must be taken into account the possibility of affection of the corners of mouth with erosive syphilitic papules, which certainly are based on tight elastic infiltrate; eruptions of syphilides are observed on the other parts of the body, as well as positive serological reactions. The treatment of different forms of impetigo, and angular impetigo is generally external. In the case of presence of crusts the ointments with disinfectants or antibiotics are applied. On the erosive wet surfaces the lotions with disinfectants (0,25% solution of silver nitrate, 2% solution of resorcinol etc.) are applied. The healthy skin around the lesion foci is regularly wiped with the *2%* salicyl alcohol in order to prevent autoinoculation of infection. At the same time, it is necessary to treat the diseases, which cause the appearance of streptoderma, and eliminate the promoting factors. ***Ecthyma vulgaris*** *(ecthyma vulgare)* refers to profound pyodermae, caused by streptococcus, though there are a number of publications, which indicate that ecthyma can be of staphylococcal etiology as well. Micro injuries and excoriations contribute to the penetration of the agents from the external environment. Nervous and mental stresses, diseases of liver and blood (anemia, leucosis), diabetes, thrombophlebitis, vasculitis, vitamin deficiency etc. are of certain importance in the pathogenesis of the disease is played. The disease develops gradually, beginning from the appearance on the skin of usual phlyctena the size of pea to a nut, filled with serous contents, which later acquire mattery hemorrhagic character. Phlyctena is located in the setting of erythematous infiltrate, its contents dry up very quickly in the crust of yellowish-brown colour, which has got multi-layer characteristic. Under the skin, there is deep tissue necrosis,

	covering not only derma, but subcutaneous fat as well. The crust drops off in several days, and the ulcer with soft uneven congested hyperemic edges and bleeding bottom, covered with dingy pultaceous detritus. After two-three weeks the ulcer is slowly cicatrizing. The scar is surrounded by the zone of hyperpigmentation. There are, as a rule, several ecthymae, and they are most frequently localized on the skin of the lower legs, buttocks, femoris, lumbus, less often they are on the upper extremities. Ecthymae can recur, causing lymphangites and lymphadenites, phlebitis, deep necroses. In the severe course of the disease so-called *ecthyma terebrans* can appear. Most frequently it occurs in undernourished children, suffering from anemia or rackets. Some authors consider blue pus bacillus to be the agent of ecthyma terebrans. In this case infiltrate and ulcerative defect spread depthward. The disease begins with the appearance on the skin of the buttocks, lower extremities, hairy part of the head of blisters, rapidly evolving into pustules and deeply ulcering. Such ecthymae cause severe pains. Ecthymae terebrans have got malignant course, are complicated by sepsis, and can be fatal. Ecthyma vulgaris most frequently should be differentiated with syphilitic ecthyma, which has not got acute inflammatory nature. There are no impetiginous multiple small elements near ecthyma, and the syphilides (especially papulous) can be detected at the other sites of the body. The final diagnosis is defined by the positive serological reactions. In case of scabies, complicated by ecthyma, military-papular rash appears on the other typical areas of skin, the borrows are typical; the patient complains about strong itching, especially at night. Hystologically, in derma and subcutaneous fat there is necrosis of tissue. The focus is surrounded with indurated infiltrate, consisting of neutrophilous leukocytes and lymphocytes. Edema and vasodilatation appear around the infiltrate. On the initial stages of the development of ecthyma vulgaris, the phlyctenae are pierced with a needle for removing their contents, the crusts are softened with application of 2% salicyl ointment. In case of formed ecthyma or

	ecthyma terebrans, antibiotic therapy in accordance with the results of antibiogram, A vitamins and B group vitamins, and disinfecting ointments for topical treatment are put on. The skin around erythema is wiped with 2% salicyl alcohol. ***Superficial chronic diffuse streptoderma*** *(streptodermia chronica diffusa superficialis)* is a chronic streptococcal disease, which is characterized by diffuse lesion of significant sites of skin covering. Most frequently it affects the lower extremities, the process can be also localized on the opistheners. The affected areas have got largely scalloped lines, sharply bordered from the surrounding healthy skin by the rim of exfoliative epidermis. The skin of the affected areas is sharply hyperemic, of congestive bluish colour, slightly infiltrative, the surface is eroded in the form of wet disk-like sites. The erosions are covered with many thin lamellate crusty scales of yellowish or greenish colour. After removal of the crusts the surface wets with the release of dense serous or serous yellow exudate. The process spreads over the periphery. With time, staphylococcal infection joins to streptococcal, though there is no lesion of hair follicle and sebaceous gland. The skin of the entire lower leg can be affected on the lower extremities. In the process of development, the lesion area is epithelialized and covered with large lamellate scales. Superficial chronic diffuse streptoderma is often complicated with eczematization, especially on separate skin areas, where against the background of bright red erythema there appear military papules, microvesicles, small erosions with release of the drops of serous fluid. In the pathogenesis of the disease development a significant role belongs to congested phenomena in the lower extremities, varicose symptom complex, i.e. prolonged disturbed circulation, development of tissue hypoxia and derangement of metabolic processes in skin. The disease has got a chronic course, with often relapses, especially around non- healing wounds and trophic ulcers. Superficial chronic diffuse streptoderma should be differentiated with eczema, when the erythema is bright red, the foci are without distinct borders, oozing lesion is punctate,

there are no crusty scales, and the process has got symmetric character.

Hystologically, in the erosion places there are no horny and granular layers. At the sites of epidermis continuity there are parakeratosis, spongiosis, intensively pronounced acanthosis. Vascular distention with perivascular infiltrate, predominantly lymphocytic occurs in derma.

In case of acute course of superficial chronic diffuse streptoderma antibiotic therapy in accordance with the results of antibiogram is put on. For topical treatment the lotions of disinfecting and astringent solutions (5% tannic or 2% boric acid, 1 % solution of resorcinol, 0,25% solution of silver nitrate) are applied. At the same time, it is necessary to carry out curative interventions, aiming at the elimination of factors contributing to disease development.

Strepto-staphylococcal skin infections - mixed pyoderma

Mixed pyoderma combine a number of chronic skin diseases of pyogenic nature, mainly polymicrobial one. Their main etiological cause is combined streptococcal and staphylococcal flora. Possible is the participation in the genesis of these diseases other microorganisms as well, such as colibacillus or blue pus bacillus, Proteus vulgaris etc.

In the pathogenesis of mixed pyoderma the essential role belongs first of all to sharp decrease of immunological reactivity of organism and the appearance of sensitization to byproducts of pyoderma agents, especially in children with allergic dermatitis, malnutrition, vitamin deficiency, metabolic disorders, endocrine dysfunctions etc.

Mixed pyoderma include impetigo vulgaris, chronic ulcerative vegetating pyoderma, chancriform pyoderma and botryomycoma.

Impetigo vulgaris *(impetigo vulgaris)* is preceded by the prodromes, such as high temperature and itching at the sites of the following rash appearance.

The disease appears at the beginning as streptococcal impetigo with the appearance at erythematous and slightly infiltrated background of phlyctenas, the contents

	of which due to overlay of staphylococcal infection get muddy quickly, become mattery and acquire yellowish-grey or greenish colouring. The matter dries up into the form of melichrous crust. After the crust drops out, the erosion appears, surrounded with delaminated horny masses of epidermis. Subjectively, the process is accompanied by light itching. Impetigo vulgaris is mainly localized on the skin of face at the sites of natural orifices, such as nostrils, mouth, palpebral fissures, in women it can sometimes be localized on the hairy part of the head as well. The process seldom causes inflammation of regional lymph nodes. The evolution of disease lasts 10 to 14 days, after that a temporary hyper pigmentation remains on the skin at the lesion sites. The possible are the lesions of mucous membranes of nostrils. The treatment is predominantly topical and includes the application of 1-2% boric-tar ointment or naphthalani unguentum. The healthy skin areas are regularly wiped around the foci with 1% salicylic alcohol. Ointments with antibiotics are applied (mupirocin). ***Chronic ulcerative pyoderma*** *(pyodermia chronica ulcerosa)* gradually transforms into ulcerative vegetating form. It is caused by the mixed strepto- staphylococcal infection. For the development of chronic ulcerative pyoderma the essential is, on the one hand, the reducing of pathogenicity of the disease agents and immunological response of the organism, and on the other hand, the weakening of the resistance of the microorganism, that leads to prolonged soft course of the disease. Its manifestations are localized exceptionally on the lower legs, and very seldom on the lower part of femora. In the setting of slightly edematous areas of hyperemia the phlyctenas appear, rapidly covered with thick crusts, beneath which the ulcers with callous undermined edges occur. After the dropping of the crusts off, the bottom of the ulcers becomes naked, it is covered with necrotic masses and soft grey granulations with significant amount of purulent and serous-purulent discharge. The process spreads over periphery, covering large sites of the skin. Around the ulcers there are pustular multiple small erosions. There is painfiilness at palpation. ***Chronic ulcerative vegetating pyoderma***

	(pyodermia chronica ulcero-vegetans) is characterized by the appearance over the ulcer periphery of vegetations, which are verrucous growths, which can appear over the entire surface of the lesion. The bottom of the ulcers is bleeding. Vegetations can enlarge along the periphery as well; in this case the process acquires serpiginous character. When pressing at the sites of lesion, the drops of dense matter are released from small fistular openings. The disease lasts for months or years and ends with formation of uneven hyperpigmented scars with small islets of unaltered skin. It is necessary to distinguish chronic ulcerative vegetating pyoderma from serpiginous nodular syphilide and verrucous form of skin tuberculosis that requires additional examination of the patient. When there are ulcerative purulent processes, the antibiotic therapy is appointed. In case of intense mattery discharges, the lotions with 2% solution of rivanol, solution of microcide (at a dilution 1:1) are appointed, and in the period of remission 2% gentian violet ointment. Pyoderma, of the type of ecthyma vulgaris, sometimes is located independently on the genital organs, resembling syphilitic chancre, hence the name of the disease of chancriform pyoderma *(pyodermia shancriformis)*. It is very seldom, that chancriform pyoderma is localized on the face, lips and eyelids. The disease is caused by staphylococcus aureus. The disease is typical for untidy persons, who do not look after hygiene of the body, as well as the subjects with the presence of narrow preputial ring, when smegma accumulation causes maceration of the skin of the penis with further suppuration. Clinically, chancriform pyoderma manifests as the appearance of clearly limited superficial ulcer of round to oval form with overlapped edges, located on the inflammatory infiltrate the size up to 2 cm. The bottom of the ulcer is fleshy red, sometimes covered with necrotic masses or purulent releases. It is painful at palpation. As a rule, with chancriform pyoderma there is regional lymphadenitis the size from kernel of a cherry to a nut, painful on palpation. The disease lasts from one to three months and ends with the cicatrization. In all cases chancriform pyoderma should be

	differentiated with syphilitic solid chancre. In solid chancre the subjective sensations (pain, burning, itching) are absent, the infiltrate is of dense-elastic, but not soft consistency, does not overlap ulcer, the acute inflammatory phenomena are absent. As a rule, there are no purulent discharges. Regional lymphadenitis is also painless on palpation, of dense- elastic consistency. In some cases the clinical picture of chancriform pyoderma reminds syphilitic solid chancre so much, that the diagnosis is possible to be set only on grounds of the results of multiple tests for Treponema pallidum and data of serological reactions. For the treatment of chancriform pyoderma the bathes with a weak solution of potassium permanganate, lotions with a physiological solution of sodium chloride or 2% solution of boric acid are applied to the full cicatrization. At the stage of differentiation with syphilitic solid chancre no antibiotics should be applied both topical, and for general therapy. The group of chronic mixed pyoderma includes also pyogenic granuloma or ***botryomycoma*** *(botriomycoma)*, which is benign fungiform tumor-like growth, caused by Staphylococcus aureus. Botrycoms is most frequently localized on the skin of vermilion border, nose, ears, on the fingers and toes. Its appearance is preceded by the injuries, cuts, pricks, by means of which pyococci penetrate into the skin. Clinically, botryomycoma manifests as small-lobular tumor on the peduncle the size of a pea to a hazelnut, of round form and soft consistency. Botryomycoma has got intense red colouring and a large number of vessels, which are easily injured and bleed. Botryomycoma with time can be partially necrotized or form an ulcer with discharge of insignificant amount of seropurulent liquid. Botryomycoma can exist without treatment for a long time, not disappearing by itself. The treatment consists in surgical (or with electrocoagulation) removal of the tumor. Sometimes botryomycoma can recur, so it is recommended to remove not only tumor itself, but its base as well, at the same time applying antibiotic therapy up to the absolute regress of the disease.

	Pyoallergids are secondary allergic diseases, which are caused by the sensitization of patient organism to pyococci and their byproducts in the presence of purulent skin diseases with chronic course. Pyoallergids are most frequently observed in case of streptococcal infections (superficial chronic diffuse streptoderma, intertriginous streptoderma and other). Pyoallergids appear mainly at the sites remote from the focus of pyoderma and are symmetrically located. Clinically, they most frequently remind eczematous reaction, as the small miliary papules and microvesicles appear on the bright red background which has not got clear boundaries, and is covered with fine scales. In the result of itch the scratches (excoriations), covered with small hemorrhagic crusts, appear on the surface of pyoallergids. And dense blisters can appear in palpation on the palms and plantae. The treatment of pyoallergids is analogous to that conducted in case of allergic skin diseases. **Prophylaxis of pyodermae.** Preventive measures are essential in treatment of purulent diseases. Physically healthy and weather-beaten people even in adverse conditions seldom suffer from pyodermae, which attack in general people, who are colds-prone, suffering from gastrointestinal disorders, increased sweating, alcohol abuse. Patients with furunculosis, hidradenitis, ecthyma, multiple abscesses, strepto- staphylodermae should exclude from their diet food rich in carbohydrates (honey, chocolate, sweets, white bread etc.) Personal hygiene of the skin is important for the prophylaxis of pyoderma. The preventive measures, aimed at the preventing of pyodermae spread, include the timely detection and medicamental sanation of people suffering from chronic nasal staphylococcal carriage. This type of nasal infection is directly connected with the risk of appearance of pyodermae and pyoseptic complications in dermatological and surgical practice. Both patients and medical staff can be the carriers of Staphylococcus aureus, as well as the personnel of child care centers and other categories of persons. To eliminate staphylococcal carriage (eradication of staphylococci), the nasal ointments with antibiotics are applied, the ointment of mupirocin, in particular, by smearing of each

	nasal opening twice a day during 5 to 7 days. Children with pustular skin diseases in children's groups must be immediately isolated and treated up to moment of disappearance of all clinical manifestations of disease. The staff of nurseries and kindergartens, suffering from anginas, herpetic eruptions, acute respiratory diseases of the upper airway, as well as pyodermae, must not be allowed to work.