Term	Topic content
Gonorrhea	Gonorrhea is a human contagious disease, caused by Gram-negative aerobic diplococcus *Neisseria gonorrhoeae*, which is predominantly sexually transmitted. **Historical information.** The modern term «gonorrhea» was firstly used in the II century AD by Galen, who mistakenly took discharge from the urethra of men as seminal fluid (from Greek, *gonos* is semen, *rrhoea* is discharge). The inflammatory process in gonorrhea is usually limited to urinogenital organs, accompanied by release and subjective disorders. The possible are also gonococcal lesions of mucous membrane of the rectum, moth cavity, nose, throat, tonsils, and conjunctiva and very seldom by generalization of infectious process. **Etiology.** The causative agent of gonorrhea is Gram-negative aerobic diplococcus *Neisseria gonorrhoeae,* discovered by A. Neisser in 1879 Gonococcus belongs to the family *Neisseriaceae,* to the genus *Neisseria.* Coccus has got the shape of coffee beans, with concave surface facing each other, with the length of 1.25 to 1.6 microns and 0.7-0.8 microns across. Gonococcus is a complex organized prokaryotic cell, with cell wall, cytoplasmic membrane, cytoplasm, consisting of ribosomal and poly-somal complexes and nucleoid. The outer three- layer membrane of gonococcus is composed of lipooligosaccharides, pili and three types of proteins. Gonococcal pili are essential for the attachment of the bacteria to the surface of various cells, such as spermatozoa, erythrocytes, mucosae epithelium. Electron microscopy studies of gonococcus ultrastructure revealed the presence of capsule substance, which prevents intracellular digestion of gonococcus and promotes incomplete phagocytosis. Gonococci stain well with all aniline dyes and discolor provided the use of Gram's stain (they are Gram-negative), what distinguishes them from the other diplococci. **Pathogenesis.** Gonococci parasitize only in human organism and affect predominantly the cells of columnar epithelium of urogenital tract, rectum, and eyes. Due to pili gonococci are quickly fixed on the surface of epithelial cells, within 24-28 hours penetrate into the intercellular gaps, and then into the subepithelial tissues, where they form microcolonies. Due to the destruction of the epithelium gonococci have got access to the superficial lymphatic and blood vessels of the genitals. In the result of canalicular and lymphatic dissemination, new sections of mucous membranes of genitals are gradually involved into the inflammation. Gonococci do not proliferate in stratified squamous epithelium and in the acidic vaginal environment, so vulvovaginitises are more common in girls and women after the onset of menopause. The possible are the lesions of rectal mucosa, conjunctiva and pharyngonasal cavity. The skin seldom is involved into the pathological process. The interaction of gonococcal infection and mucous membranes of various organs is determined by different anatomical, physiological, immune and hormonal characteristics of the organism associated with

	the age and sex. Gonorrhea, like other sexually transmitted infections, is an anthroponotic infection. The causative agent quickly dies outside the human body. Introduction of infection occurs primarily through sexual contacts. Contagiousness of gonorrhea for women is much higher than for men. The period, which is necessary for the development of the inflammatory response, is usually called the incubation period. On average the incubation period of gonococci is 3-10 days, but its duration may vary within wide limits. Then there appear the clinical signs of the disease, the main manifestation of which is purulent discharges from the urinogenital organs. Phagocytic reaction in gonorrhea depends on the reactivity of the organism and the intensity of the production of endotoxin by gonococci. The course of the infection process is defined by the ratio of complete and incomplete phagocytosis. In the phagocytic reaction the polymorphonuclear leukocytes PMNL, macrophages, lymphocytes and epithelial cells are involved. Acute gonorrhea is characterized by incomplete phagocytosis involving predominantly polymorphonuclear leukocytes. Between them (PMNL) and macrophages there exists the co-operation, in which the partially lysed gonococci together with the broken ones are captured by macrophages, which carry phagocytosis to completion. After the disease a true post-infectious immunity does not appear. After the recovering, in case of new contact with gonorrhea sufferer, the reinfection is possible. In addition to reinfection, superinfection is possible, which usually appears in the presence of encysted lesion focus. Recurrence of gonorrhea usually occurs in the period of the first two weeks or during one month after the end of the treatment. Gonococci are located predominantly inside the cell and have a tendency to transformation. Reinfection occurs most frequently in 2-3 months after the end of the treatment and is accompanied by acute or subacute inflammatory process. **Epidemiology.** According to WHO data, the incidence of gonorrhea in the world is about 65 million cases per year. High incidence of the disease is contributed by the characteristics of the modern course of the disease, such as increased number of asymptomatic, oligosymptomatic and chronic forms, accompanied by immune disorders and various complications. Currently, the course of gonorrheal infection is complicated by a number of peculiarities, in particular, the growing number of penicillinase-producing strains of gonococci and reducing sensitivity of the pathogen to antibacterial drugs, an increased frequency of mixed infection. Social meaning of gonorrhea is defined by the high level of morbidity and the rapid development of complications. The source of the infection is patients with gonorrhea often with the asymptomatic

	or low-symptom forms of the disease. The main way of infection is sexual. Infecting through sexual partners, in case of oral-genital contacts leads to the development of gonorrheal tonsillitis, and in case of genital-anal contacts leads to gonorrheal proctitis. Nonsexual infection is possible through direct contact (in the result of entry of discharge onto the mucous membrane of the eyes, mouth cavity and rectum when passing through the birth canal, the issue on possibility of intrauterine infection is under discussion). Indirect nonsexual infection occurs in case of very close household contact of a small child with a sick mother via a common bed and hygienic or toilet articles. **Classification.** In the domestic clinical practice classification of gonorrhea is based on the duration of the disease. Distinction is made between *recent gonorrhea* with the duration of the pathological process of up to two months, and *chronic gonorrhea* with duration of more than two months. Depending on the severity of the clinical manifestations the recent gonorrhea is divided into *acute, subacute* and *torpid.* There is also latent gonorrhea (gonococcal carriage), in which the presence of the pathogen in the mucosa does not cause any inflammatory reaction. When infection gets into the blood circulation disseminated gonococcal infection may develop. According to the International Classification of Diseases (ICD-10) there are different forms of gonococcal infection with indication of the localization process. **Clinical manifestations of gonorrhea in men.** Gonorrhea in men occurs predominantly in the form of destruction of urethra that is urethritis. The clinical signs of the disease are characterized by the appearance of pain during urination and suppurative discharge from the urethra of different degree of intensity. Depending on the clinical manifestations urethritis can be *acute, subacute, torpid* and *chronic.* ***Recent acute gonococcal urethritis.*** Acute inflammation of the urethra is characterized by edema and hyperemia of the urethral sponges, abundant purulent yellowish green discharge from the urethra during the whole day, lancinating pains during urination. *Acute anterior gonorrheal urethritis* is characterized by the inflammatory reaction of the mucous membrane of the distal part of the urethra, pain appears at the beginning of urination, and in case *of acute total urethritis,* when inflammation covers the whole urethra, pain increases at the end of urination (this is the sign of urethrocystitis). Total urethritis is often accompanied by the frequent urgency of urination (up to 15-20 times a

	day), painful erections and emissions. In the case of pronounced inflammation, the purulent discharge becomes bloody, there appears hemospermia. With time acute inflammation without treatment can move into the *subacute stage* or initially urethritis can be characterized by moderately pronounced clinical signs. In this case, the swelling and hyperemia of urethral sponge are weakly pronounced. Discharge in the form of moderate or insignificant purulent or serous-purulent release occurs mainly in the morning after overnight break in urination. Feeling of pain during urination is characterized as insignificant. Manifestations *of torpid (asymptomatic) urethritis* follow the subacute stage, and can also appear at the beginning of the disease. If the patient does not consult a doctor in time, if he did not receive appropriate treatment or the therapy was irrational, if he self-medicated, drank alcohol and ate spicy food, did not interrupt sexual contacts, then inflammatory process becomes chronic. ***Chronic gonococcal urethritis.*** Clinical signs of chronic urethritis are mild itching during urination, insignificant discharge, which occurs in the morning or when pressing on the urethra. Chronic gonorrheal urethritis, as well as the recent one, can be *anterior and posterior*, though it is rare limited by the anterior urethra and has got usually a total character. As a rule there are no complaints in chronic gonorrhea, the possible is a slight itching or burning sensation in the urethra. In the morning if pressing at the external opening of the urethra a small drop of yellowish or turbid discharge can be seen. The discharge often is so insignificant, that it does not form a drop, but dries up and agglutinates the sponges of the external opening of the urethra. In many cases the discharge has such a viscous consistency that it stays in the cannel and can be found in the form of filaments only during visual examination of urine. Chronic gonorrhea generally has a torpid course with periodic exacerbations. ***Clinical manifestations of gonorrhea in women.*** Gonorrhea in women is characterized by the oligosymptomatic course and multifocal lesions. These features are associated with the anatomical features of female genitourinary organs. In women, gonorrhea affects the cervical canal, urethra, vulvovaginal glands and rectum, in girls, vulvovaginitis develops, the development of proctitis is possible in the result of leakage of purulent discharge from the vagina. Gonococcal lesions in women can appear at the same time in several places (urethritis, endocervicitis, etc.) and be not accompanied by significant subjective sensations. There are the following clinical varieties of gonorrheal infection in women: *gonorrhea of the lower genitourinary tract*, these are

	urethritis, bartholinitis, vestibulitis, vulvitis, vaginitis, endocervicitis, *gonorrhea of the upper genitourinary tract or ascending gonorrhea* — gonococcal endometritis, salpingitis, oophoritis, pelviperitonitis. Depending on the duration of the disease there are recent and chronic gonorrhea, and on the activity of the clinical symptoms there are acute, subacute, torpid and latent gonorrhea. ***Gonorrhea of the lower genitourinary tract*** Gonorrheal urethritis in women in its clinical manifestations reminds the same disease in men and is characterized by pain and a burning sensation during urination. With the spreading of the infection along the urethra there appear the symptoms of urethrocystitis, dysuria in the form of frequent and painful urination. Intensity of symptoms in women can be quite variable, but it is observed that the incidence of *torpid and asymptomatic* forms is significantly higher than in men. In the setting of *recent acute gonorrheal urethritis,* the urethral sponges are hyperemic and swollen, after the massage of the urethra a drop of matter is discharged from its external opening. In case of recent torpid and chronic *gonorrhea,* the hyperemia and edema can be absent; during palpation the infiltration is discharged along the urethra. *Vaginitis (vulvovaginitis)* occurs in girls, pregnant and menopausal women in the setting of the corresponding hormonal features. In adult women the phenomenon of vestibulitis and vaginitis can develop in presence of acute gonorrhea in case of the overlay of secondary infection (Staphylococcus, Escherichia coli). There occurs a lesion of squamous epithelium with desquamation and erosion of mucosa, resulting in the observed clinical manifestations. Acute process is characterized by the presence of heavy discharge, pain, burning sensation and itching. The walls of the vagina are edematous, hyperemic and painful. With torpid and chronic course of vulvovaginitis the clinical manifestations can be less pronounced or absent. *Bartholinitis* is inflammation of the large vestibular glands. The process typically occurs on both sides. The clinical picture is determined by the degree of dissemination of inflammatory process. The lesion can be limited by excretory duct, cover completely the gland, fall outside its bounds. In case of disorder of outflow of gland secretion, the false abscess can be formed, which does not cause abnormality of general condition and breaks spontaneously after some time. In case of joining of the secondary infection there is meltdown of the gland wall with the spreading of inflammation over the surrounding tissue and with the formation of true abscess. This condition is accompanied by the appearance of symptoms of intoxication, disorder of the general condition, sharp painfiilness of lesion focus. *Endocervicitis* is an inflammation of the mucous membrane of the cervical canal. Columnar epithelium lining the cervical canal is affected in the first place. With acute and subacute process, the purulent discharge from the cervical canal promotes maceration of the stratified squamous epithelium of the vagina, which leads to the

	appearance of leucorrhea. On examination in mirrors hyperemia and edema of the vaginal part of the cervix, the erosion of the external os, purulent discharge from the cervical canal are determined. In the case of a chronic course of the process, the discharge is minor or absent, the cervix can be deformed, there are erosions on the surface of the cervix at the external os, while taking the material the bleeding is not rare. ***Gonorrhea of the upper genitourinary tract*** Ascending gonorrhea in women can have the following clinical forms: ■ *Genital,* these are endometritis, salpingitis, salpingoophoritis, pelviperitonitis; ■ *Extragenital,* these are proctitis and pharyngitis. *Endometritis* is a consequence of an ascending infection from the cervical canal, leading to the lesion of the mucous membrane of the body of uterus. In the case of an acute process the colicky lower abdominal pains appear, the body temperature raises to 39 ° C, there are abundant sanies, and disrupted menstrual cycle. In chronic process, there are dull lower abdominal pains, periodic spotting, gaping cervix and scanty, mucopurulent discharge. *Salpingitis* is an inflammation of the uterine tubes. During the dissemination of the inflammatory process over the ovaries, there occurs salpingoophoritis. Acute inflammation in this area is characterized by the pronounced lower abdominal pains amplifying at movement, urination and defecation. There are symptoms of intoxication, temperature rise up to 39 ° C, disruption of the fecal masses formation, menstrual irregularities, and more frequent urination. The chronic process is accompanied by moderate pain in the iliac region, menstrual irregularities, and scanty mucous secretions. Salpingoophoritis can cause infertility due to the blockage of uterine tubes, the development of connective tissue in the result of the inflammatory process in the area of the appendages. Chronic inflammatory process of this localization can cause ectopic pregnancy. *Pelviperitonitis* is a serious complication of gonococcal infection associated with inflammation of the pelvic peritoneum. It is characterized by sharp colicky lower abdominal pains. There appear dyspeptic phenomena, constipations, bloating, and disorders of urination. The body temperature is increased up to 39 ° C, there are symptoms of intoxication, anterior abdominal wall is tense in palpation, and there is positive Blumberg symptom, in a clinical analysis the EST is increased with normal amounts of leukocytes of blood. *Gonorrheal proctitis and pharyngitis* are the forms of extragenital gonorrhea. Gonorrheal proctitis occurs in girls and women in case of leaking of purulent discharge from the vagina or in anal variant of sexual contacts in people of both sexes. Acute gonorrheal proctitis is characterized by pains during defecation,

	itching in the anus area. In the case of the formation of erosions and cracks blood can appear in the feces. The anal area is hyperemic, in the folds the matter is accumulated. There can be no complaints in recent torpid and chronic forms, and the signs of the inflammation in the form of hyperemia, swelling and erosion of the mucous membrane of the rectum are only detected in rectoscopy. Gonococcal pharyngitis and tonsillitis occur as the consequence of oral-genital contacts and have not got the characteristic differences from other inflammatory processes of this localization. The diagnosis is set only on the basis of the results of bacteriological examination. *Gonorrhea in girls* results from the nonobservance of hygienic norms in time of direct contact with adults with gonorrhea or through transferring infection by means of household items. The girls of older age can catch a disease at attempt of sexual contact. A distinctive feature of the inflammatory process, associated with anatomical and physiological characteristics of the girls, is the simultaneous lesion of external genitals, vagina, urethra, and often rectum as well. *Disseminated gonococcal infection* occurs in the case of penetration of the agent in a blood channel, favored by the destruction of the mucous membrane of the primary focus of infection. Gonococci in blood usually die under the influence of factors of natural immunity. However, in some cases, getting into the blood stream, gonococci are able to multiply and enter in various organs and tissues, causing lesions of joints, endocardium, liver, meninges, skin. The course of disseminated gonococcal infection does not depend on the nature of the primary site and the virulence of the organism. Dissemination occurs in case of long-lasting undetected infection, improper treatment, immunedeficiencies of different nature, menstruation, pregnancy, lesions of mucous membrane at instrumental manipulations and sexual contacts. Disseminated gonococcal infection has severe and mild form. Severe form occurs with pronounced signs of intoxication, such as fever, chills, tachycardia. Polyarthritis is typical with the purulent joint effusion; in case of skin lesion there are predominantly vesicle-hemorrhagic rashes with necrosis. With severe form, sepsis can develop, followed by endo-, myo- and pericarditis, meningitis, hepatitis. With mild form the lesion is limited predominantly to knee-articular syndrome. *Gonorrheal arthritides* in their clinical manifestations are similar to other bacterial inflammatory lesions of the joints. The presence of the primary site of infection and detection of gonococci in the articular cavity confirm the diagnosis. *Gonococcal eye lesions* are frequent manifestation of gonococcal infection in adults, which develops as a result of mechanical transfer of the pathogen from the genital organs to the conjunctiva. Gonococcal conjunctivitis, iridocyclitis, gonococcal ophthalmia in neonates occurs during infection when passing through the birth canal, or in utero. The cases of transmission of infection from the medical personnel are casuistical. The incubation period lasts from 2 to 5 days. In case of intrauterine infection the disease is pronounced in the

first day of life. Gonococcal conjunctivitis is characterized by edema and hyperemia of eyelids, photophobia, and abundant purulent discharge from the eyes. In the absence of treatment the process extends to the cornea, causing swelling, infiltration, turbidity and ulceration. Neonatal ophthalmia occurs in the case of penetration of infection in the area of the inner shells of the eye. The occurring ulcer with subsequent cicatrization can lead to blindness.

Modern peculiarities of gonococcal infection lie in the fact that gonorrhea occurs predominantly as a mixed infection. With that the clinical manifestations, periods of incubation can change, complications can develop, etc.

Complications of gonococcal infection. The characteristics of anatomy of the urethra in men lead to a number of peculiar morphological changes caused by the migration of lymphocytes, neutrophils, and plasma cells in lesion focus. As a result an inflammatory reaction develops that is clinically manifested in the formation of subepithelial cellular infiltrate. The formation of urethra infiltration causes destruction of elastic tissue. Destruction of elastic fibers starts quite early and develops in proportion to the intensity of inflammation. With chronic gonorrheal urethritis the further development of changes occurring in the acute stage is observed. It is not always possible to provide a clear pathologicoanatomic demarcation between acute and chronic inflammation, because the transition from one process into another is slow and gradual. The epithelium of the urethra is subjected to the further metaplasia and gets the tendency to keratinization. Inflammatory cellular infiltrate in the mucosa and submucosa of the urethra tissue acquires a pronounced focal character and is gradually replaced by connective tissue. Depending on the degree of cellular infiltration and the presence of connective tissue in the focus of inflammation there are two pathohistological groups of urethrides.

The first group includes gonorrheal urethritis, characterized by prepotency of cellular infiltration (soft infiltrate) in the presence of insignificant amount of connective tissue. The second group consists of urethritis with a solid infiltrate, in which the predominant element is the connective tissue. Such infiltration is observed in cases of chronic gonorrhea. Along with the changes in the mucosa and submucosa of the urethra, there are also significant changes in the urethral glands and crypts in the form of deposition of connective tissue in or around the crypts and littritis gland. Complications of gonococcal infection include:

Littritis is inflammation of alveolar tubular glands located in the urethra. When overlapping the opening of the glands by inflammatory infiltrate they can take the form of dense painful knots (pseudo abscesses), perceptible on palpation. Sometimes pseudo abscess reaches a considerable size, the periurethral abscess can appear in case of purulent dissolution.

Morganite is an inflammation of the Morgagni's lacunae, as well as littritis, is a complication, which occurs most frequently in gonorrhea and has got similar clinical manifestations.

Tysonitis is an inflammation of Tyson glands located on both sides of the penis

	frenulum. They are defined as inflammatory nodules on palpation. While squeezing the glands there can be the purulent discharge from the excretory ducts. Also, abscess of gland is possible, in case of ductal blocking. *Parauthretitis* is an inflammation of the paraurethral cannels, which in the acute phase is masked by manifestations of urethritis. Isolation of the pathogen in the paraurethral canals can cause a recurrence of gonorrhea. Parauretrit manifests itself as infiltration in the projection of paraurethral duct and hyperemia of the ostium of discharge opening. When closing openings the lacunar abscess can be formed. *Periurethritis* develops as a result of penetration of gonococci in the periurethral tissue and the corpus cavernosum of urethra. Periurethritis looks like infiltrate with indistinct contours, which can cause abscess formation, the curvature of the penis, urination disfunction with the subsequent formation of urethral strictures. *Colliculitis* appears during the propagation of the inflammatory process in the area of seed tubercle and manifests itself as a painful syndrome of different severity, radiating to the lumbar region, hips, lower abdomen, and genital organ. Colliculitis is often accompanied by sexual disorders in the form of premature or late ejaculation. There are catarrhal, interstitial and atrophic colliculitis. *Cowperitis* is an nflammation of the bulbourethral glands. The clinical picture of acute process is characterized by throbbing pain in the perineum, increasing during defecation, movement and pressure, more frequent or difficult urination. Fever up to 38°C and chilly sensation is typical from the general phenomena. Chronic cowperitis is characterized by heaviness and aching pain in the perineum, increasing during prolonged sitting, periodic discharge from the urethra, mainly in the morning. *Prostatitis* is the most common complication of gonorrhea. Prostate infection occurs in lesion of the posterior urethra by gonococci. Catarrhal prostatitis appears in case of limited lesion of the prostate ducts. With involvement of lobules gland in the pathological process the follicular prostatitis develops, and in the case of the dissemination of the pathological process in the parenchyma, there occurs parenchymatous prostatitis. *Vesiculitis* is an inflammation of the seminal vesicles, often combined with prostatitis. The acute form is not frequent and is characterized by the common occurrences of intoxication, fever, haematuria and haematospermia. The more frequent is chronic vesiculitis, which can be asymptomatic and is revealed at clinical and instrumental examination. During exacerbation there appear pelvic pains radiating to the urethra, perineum, rectum, painful pollutions, haematospermia and premature ejaculation. *Epididymitis* is an inflammation of testicular appendage. Typically, the process is of unilateral nature. Gonococcal infection is the most common cause of this

condition. Antiperistaltic movements of deferent ducts promote the development of epididymitis. Along with the appendage the deferent duct (deferentitis appears) and the tissue surrounding the spermatic cord (fiiniculitis) are involved in the inflammatory process. Acute process is characterized by the development of the common phenomena of intoxication, fever, increasing temperature up to 39-40 ° C. In the setting of the pain syndrome there appear hyperemia and edema of the corresponding scrotal half. At the same time there are the clinical signs of acute total urethritis with the presence of discharge and dysuric phenomena. The increased and painful appendage of testis in the form of a helmet is detected on palpation, which covers testis over its back and bottom surface. At the beginning, the inflammatory process is localized in the tail of the epididymis (testicular appendage), and only then spreads to the body and head of the epididymis. With that the testis itself can remain unaltered. It is often that epididymitis initially has subacute or torpid course without common phenomena and with indistinct clinical picture. Chronic epididymitis is a final phase of acute inflammatory process. Epididymoorchitis leads to fibrosis and cicatrization. This can result in cicatricial obstruction of deferent duct and the formation of obstructive infertility.

Balanoposthitis and phimosis occur more frequently in the presence of a long and narrow foreskin. The clinical manifestations of these complications do not differ from the similar in case of disease of non-gonococcal etiology.

Diagnose. Clinical diagnostics includes history and complaints taking, inspection and collection of material for laboratory examination. *When taking history and complaints*, it is necessary to clarify the period since the sexual contact with supposed source of infection to the appearance of subjective symptoms, as well as whether the sexual partners were examined by the specialist and what diagnose is set to them. *Visual examination* includes the inspection of the skin and visible mucous membranes, hair part of the head, neck, trunk, extremities, genitals and perianal area for excluding skin diseases and other infections, mainly sexually transmitted. It is necessary to palpate all groups of superficial lymph nodes, such as submandibular, supraclavicular, inguinal, popliteal, for excluding regional lymphadenitis. In women the abdomen, greater vestibular and paraurethral glands, urethra are palpated, a bimanual gynecological examination is carried out. In men it is necessary to palpate the urethra, the prostate gland (prostate massage is contraindicated in acute process), bulbourethral Cowper's gland and organs of scrotum. Palpative examination is performed to exclude associated pathology and for clinical assessments of the affected organs. For establishing the diagnosis of gonorrhea the laboratory data are of decisive importance.

The etiological diagnosis is established on the basis of *bacterioscopic and bacteriological methods of examination*. The material for the study can be discharge of urethra, cervical canal, conjunctiva, the secretion of sexual glands, swabs from

	the rectum, the lacunae of tonsils, back of the throat. Discharges for the analysis are taken by the Volkmann's small spoon or a special bacteriological loop. Sampling from the different foci is aimed to the efficiency and specificity of diagnostic methods. At urethral inspection the material is taken no earlier than 4 hours after urination, otherwise discharge can be rinsed off by urine. Taking into account the prevalence of mixed forms of infection the diagnostics of other sexually transmitted infections must carried out concurrently. For *microscopic study* the discharge of urethra, cervix, cervical canal is taken by the Volkmann's small spoon or special bacteriological loop and placed it onto the glass slide. Two preparations are to be prepared simultaneously for the two staining methods; these are the Gram's stain and methylene blue method. At this, it is necessary to take into account that Gram's stain has the basic differential diagnostic meaning. Gonococci are discolored during the Gram's staining (Gram-negative), that distinguishes them from other diplococci. At the same time it is necessary to make cultural research. Given the high sensitivity of gonococci to drying and thermal exposure, it is recommended to seed immediately to the culture medium for the isolation of gonococci. The stained preparations are placed under microscope with immersion. The characteristic location for gonococci is inside the white blood cells (endocytobiosis), especially in case of acute forms of gonorrhea; in case of chronic gonorrhea, the agent can be both intracellular and extracellular. When establishing the diagnosis of gonorrhea in pregnancy, teenagers and children, as well as in case of sexual violence the cultural research is obligatory irrespective of the results of the microscopic examination. *Modern nonculture methods of identification of gonococci*, such as nucleic acid amplification methods have high sensitivity and specificity, with allows using them for screening in the study of clinical materials obtained by non-invasive methods. But, in the case of detection of *N gonorrhoeae* by these methods in any clinical materials the culture diagnostics must be carried out with identification of agent, which allows determining the sensitivity to antibiotics. With this, molecular-biological methods of research allow to carry out diagnostics of several sexually transmitted infections simultaneously. *Serological methods* in diagnosing of gonorrhea have got no significance. Complement fixation reaction (Bordet-Gengou test) becomes positive after 3-4 weeks since the onset of the disease and can be positive during 10 years, which excludes its use for the diagnostics of gonorrhea and recent forms of gonorrhea and in case of control of healing. *Topical diagnostics* is performed to determine the localization of the inflammatory process. Two-glass Thompson's test, urethroscopy, the prostate and seminal vesicles status examination with microscopy of their secretion, ultrasonography are applied in men. *The Thompso`n s test* is a simple and quite informative method for differentiating variants of urethral lesions and diagnostics of complications. Turbidity of the first portion of urine and of transparency of a second portion indicates the presence of anterior urethritis. More total urethritis is characterized by the turbidity of both portions of urine. The change of the second portion of urine may also be a sign of the disease of the

	prostate, seminal vesicles. The exact topic diagnostic of inflammatory changes in the urethra is carried out with urethroscopy. This methodology is used only for chronic forms of the disease and torpid course of gonorrhea, as in case of acute forms there exists the risk of ascending infection. With help of urethroscopy the presence of soft or hard infiltrate in the urethra, the presence of littritis, morganite and colliculitis is established, and the necessity and scope of topical treatment is considered. In women, changes in the cervix and vagina are determined by means of colposcopy, in order to avoid damage of the uterus and appendages *bimanual and ultrasound examination* is performed, rectoscopy is carried out in case of indications. **Treatment.** The success of treatment of gonorrhea patients depends mainly on the correct etiological and topical diagnosis and timely started therapy. The scope and duration of etiological treatment depend on the period of the disease and the presence of complications. When choosing a medication the possible presence of mixed infections must be taken into account. For the last decades the urgent became the problem of the resistance of N. gonorrhoeae to antimicrobial medicines. Antibiotic, which is prescribed for the treatment of gonorrhea, should ensure clinical efficacy in single dose against all strains of pathogens. The preparations of group of Penicillin are known as the first highly effective treatment of various forms of gonorrhea. Until recently, the preparations of this group were recommended as the antibiotics of choice in the causal therapy of gonorrhea. At the current stage due to increasing prevalence of strains of N. gonorrhoeae, which are resistant to penicillin and its derivatives, the therapeutic use of medicines of this group is possible only in case of proven sensitivity of gonococcus to a particular medicine. Currently, the first-line drugs in the causal treatment of different forms of gonorrhea are antibiotics of cephalosporin group. Antibiotics, tetracyclines, macrolides, and azalides are also widely used in the treatment of gonorrhea, particularly in combination with other urogenital infections (gonococci + Chlamydia, myco- and ureaplasma). At the same time, the relevant antibiotics belong to the backup group and are applied only in the case of proven resistance of N gonorrhoeae to penicillins and cephalosporins or in case of their intolerance. Treatment of the patients with localized recent acute and subacute uncomplicated gonorrhea with involvement of the lower genitourinary tract is performed on an outpatient basis with use of antibiotic therapy only. Treatment of the patients with recent torpid or chronic gonorrhea, as well as any other forms of gonorrhea in the presence of complications, is conducted in specialized medical institutions of dermatovenereological profile. Therapy of these forms of the disease, in addition to a causal treatment may include the appointment of immunotherapy, topical treatment, physical therapy after corresponding topical diagnostics. Prior to the administration of antibiotics the serological testing for syphilis of gonorrhea patients must be performed. In case of impossibility of such examination of sexual partners, the serological testing is to be

	repeated after three months. For the treatment of localized gonococcal infections of the lower genitourinary tract, the following medications are appointed: sodium (potassium) salt of benzyl penicillin (6 million units of activity by intramuscular injection 3 million units in each buttock), novocain salt of benzyl penicillin (4.8 million units single dose), procain penicillin G (6 million units single dose), ceftriaxone (1.0 g single dose), cefotaxime (1.0 g once by intramuscular injection), ciprofloxacin (500 mg single dose orally), ofloxacine (400-800 mg single dose orally), spectinomycin (2.0g single dose). In the cases of mixed gonococcal and trichomonal infection the simultaneous treatment of gonorrhea and trichomoniasis is recommended. In combination of gonorrhea with clamidiosis and mycoplasmosis, the antibiotic therapy is initially performed, aimed at the elimination of N. gonorrhoeae, in particular by benzyl penicillin and then anti-chlamydial and anti-mycoplasma preparations are appointed. Patients with torpid and chronic forms of gonorrhea are recommended medicines stimulating the increase of specific and non-specific reactivity of the organism in infection fighting. Gonococcal vaccine is applied as specific immunotherapeutic preparation, and for stimulating non-specific resistance of the organism the preparations are applied, which activate a number of cellular and humoral factors of immune system, such as pyrogenalum, prodigiosanum, methyluracilum and others. The local treatments are combined with other forms of therapy, sometimes they are used to increase the metabolic processes in the affected organs, to enhance the permeability of tissues in the lesion focus, for some aggravation of inflammatory process, and before the appointment of the etiotropic therapy as well. In chronic urethritis, the urethral instillations are carried out with 0.25% silver nitrate solution or 2.1 % sodium Protargolum, 2% oil solution of clorophylliptum, for the treatment session of 6-10 procedures. Vaginal washings are carried out with warm (37-38 ° C) solution of potassium permanganate (1:8000), camomile infusion and other medical means by douching 4 times a day at regular intervals. The vaginal baths are also applied. 20-30 ml of 2.1 % solution or Protargolum or Collargolum is poured through the gynecological speculum, introduced into the vagina. Urethral bougienage is mainly recommended for the treatment of infiltrates located on the mucous membrane of the urethra, the lesion of its glands, narrowing (strictures). For this purpose the metal (curved and straight) and elastic bougies are applied. The procedures are carried out every other day for the treatment session of 10-12 procedures. Ultrasonic bougienage is the most effective in the treatment of urethral strictures. In the treatment of chronic gonorrhea and its complications paraffin- ozokeritotherapy, diathermy, inductotherapy, ionophoresis, mud therapy and other are widely used. Therapy of gonococcal pharyngitis is conducted with the participation of the

	otorhynolaryngologist. In the treatment of complicated gonococcal infections of the upper and lower parts of the urogenital tract, gonococcal peritonitis, gonococcal infection of the musculoskeletal system one of the following treatment schemes is used: ceftriaxonum - 1.0 g by intramuscular or intravenous injection every 24 hours, cefotaximum - 1.0 g by intravenous injection every 8 hours, spectinomycinum - 2.0 g by intramuscular injection every 12 hours, ciprofloxacinum - 500 mg every 12 hours. Intravenous or intramuscular administration of one of these preparations must be continued no less than seven days. After negativation of clinical symptomatology, the therapy is continued for 24-48 hours, after that the oral administration of ciprofloxacinum or ofloxacinum is appointed. The treatment is carried out during the period of 14 days; the extension of therapy should be strictly reasoned. Selection of the above- mentioned medicines is carried out considering the data from medical history (allergies, idiosyncrasy), the study results of gonococcus sensitivity to antimicrobial drugs, the patient's age etc. Treatment of pregnant women is carried out at any stage of pregnancy with antibacterial medicines taking into account their possible toxic effects on the fetus. Treatment of children is carried out with the obligatory assistance of pediatrician. Treatment of neonates born by mothers with gonorrhea is performed with the assistance of neonatologists. **Criteria of gonorrhea cure.** Control tests are carried out 10-15 days after the end of treatment. The obligatory bacteriascopical and cultural examination of discharge of material is conducted, a great attention is paid to determining the amount of leukocytes. In case of absence of clinical manifestations and with negative results of laboratory research, the patients are left on the medical observation at and the similar tests are repeated after 1-1.5 months. In women, the material for laboratory examination should be collected 1 -2 days after menstruation, during 2-3 menstrual cycles. If after repeated gonococcal test, the results are negative and gland state is normal, patients are removed from dispensary registration. **Prevention.** Basic principles of prevention of gonorrhea are the timely treatment, the identification of sexual contacts and sources of infection, family members' workup, and cure control. Preventive maintenance must be carried out among the patients with gonorrhea in order to prevent sexual contacts during the infectious period, and it must also be aimed at the reducing probability of re-infection among patients and people with past gonorrhea. For the success of preventive maintenance the close relationship of dermatologists with urologists and gynecologists is required. Explanatory talks and lectures, conducted by the medical staff, the presence of available literature on the prevention of gonorrhea and other infections mostly sexually transmitted in medical institutions are of great concern. Preventive measures lay

	also in educational work among the persons of the risk groups, pregnant women, care workers. In the maternity hospitals for the prevention of neonatal ophthalmitis all children immediately after birth the eyes are instilled twice with 30% solution of sulfacyl sodium. In the preventive maintenance of gonorrhea the important is the ability of a doctor to collect history of the patient sexual life, to properly conduct educative activities, to make recommendations for the prevention of sexually transmitted infections.
	Non-gonorrheal contagious diseases A group of non-gonorrheal contagious diseases includes Genitourinary and extragenital lesions caused by Trichomonas, Chlamydia and some other pathogens. **Genitourinary Trichomonasis** *Genitourinary trichomonasis (trichomonasis)* is wide spread inflammatory disease of human genitourinary tract, which is, mostly, sexually transmitted and is caused by Trichomonas vaginalis. **Etiology.** The causative agent of genitourinary trichomoniasis is Trichomonas vaginalis *(Trichomonas vaginalis)* - a microorganism that has adapted through evolution to parasitism in human genitourinary system. *T. vaginalis* belongs to the genus of Trichomonas, which also includes intestinal *T hominis (intestinalis)* and oral cavity *T. tenax (elongate)* saprophytes. The colonization of genitourinary system with oral and intestinal species of Trichomonas does not lead to the development of pathological process. *T. vaginalis* is the only pathogenic species of Trichomonas for humans that does not cause disease in animals and cannot exist outside the human body. *T. vaginalis* is the simplest single-celled organism from flagellates *(Flagellata)* class, belonging to *Trichomanadidae* family of *Trichomonas* genus. There is only one form (or stage) of the development of vaginal trichomonas i.e. trophozoite. The causative agent, preferably, has oval pear-shaped nucleus. At the front end of the body of Trichomonas there are four free flagella extending from basal corpuscle. The fifth flagellum goes back to about one third of length of the body, thus forming an undulating membrane. There is an axostyle all along the cell. Dimensions of Trichomonas fluctuate significantly depending on the growth conditions and characteristics of the strain. Average sizes of *T vaginalis* are

10-30 Mm in length and 5 Mm in width. All the elements of Trichomonas vaginalis structure are detected by special staining methods, while in usual diagnostic tests specialists are guided by the size, shape and mobility of cells. Trichomonas is actively moving by means of free flagella and undulating membrane. Under certain conditions, they form pseudopodia, which ensure amoeboid movement.

The main method of reproduction of Trichomonas is division of a cell into two daughters, but sometimes there is schizogony type of division into 8-24 cells. Multiple fission occurs more often under adverse conditions of existence, and Trichomonas do not form cysts, which explain their rapid death outside the human body. Today there are known three morphological forms of *T vaginalis* i.e. pear-shaped (flagellar), amoeboid and round (spherical). At the outbreak of chronic inflammation Trichomonas are often round-shaped resembling the nucleus of epithelial cells, making it difficult for the microscopic identification of pathogen. Trichomonas feed themselves endosmotically and by phagocytosis. The optimal pH for the existence of *T vaginalis* is 5.2-6.2. Trichomonas on artificial media develop at 36.5-37 ° C. *T vaginalis* culture, unlike other cultures, is not capable of hemolysis, plasma-coagulation, it cleaves glucose, maltose, starch well, but lactose - weak, it does not form a hydrogen sulfide and indole. Being out of human body, Trichomonas die quickly because of drying. Direct sunlight, a solution of carbolic acid (1 %) and chloramine B (1 %) are detrimental for *T vaginalis*. Trichomonas are resistant to low temperatures and can remain viable at -10 ° C up to 22-45 min. and for 95-115 minutes at 1 -4 ° C temperature.

Epidemiology. Based on WHO data, more than 180 million cases of genitourinary trichomoniasis are registered each year all over the world. Trichomonas infection occurs through an infected person, most often it happens during sexual intercourse. So far, the epidemiology of genitourinary trichomoniasis has been studied badly, but the prevalence of infection is increased in older age groups, unlike gonorrhea and chlamydia, which are most common for those aged 19-29 years. In women with inflammatory diseases of pelvic organs, Trichomonas are identified in 5,6-20,6% of cases, in pregnant women - in 0,98-32%, while in patients with infertility - in 19.5% cases, in men with inflammatory diseases of genital area - in 0,2-8,5% cases. There is a connection between genitourinary trichomoniasis and premature birth and low birth weight of newborns.

In recent decades, the incidence of genitourinary trichomoniasis has

	remained high. The infection occurs as a result of close household contacts. *T vaginalis* may also be the etiologic agent of pneumonia in neonates and such children may die if untreated with specific drugs. Perinatal trichomonas infection occurs in about 5% of infants born from infected mothers and *T vaginalis* may stay in the child's body from 3 to 9 months or more. **Classification.** Depending on the duration and intensity of organism's reaction to the presence of *T vaginalis* there are the following forms of trichomoniasis: 1) *recent trichomoniasis* (with disease duration of up to two months), which, in its turn, is divided into *acute, subacute and torpid (oligosymptomatic)',* 2) *chronic trichomoniasis,* which is characterized by torpid course and duration of the disease for more than two months; 3) *trihomonas-carriage,* when in the presence ofTrichomonas no any subjective and objective symptoms of the disease exist. **Clinical presentations.** The incubation period of genitourinary trichomonas infection is from 3 days to 3-4 weeks (usually 7-10 days). Colonization of genitourinary tract with *T vaginalis* leads to the development of mucosal, skin and affected organs sub-epithelial tissue inflamation. Morphological changes of epithelium are characterized by degeneration, desquamation, proliferation, metaplasia and formation of inflammatory infiltrate consisting of lymphoid elements, histiocytes and plasma cells with a mixture of leukocytes. Often genitourinary trichomoniasis runs subjectively, without any manifestations of symptoms. More than 30-40% of women and 60-70% of men with *T vaginalis* do not have any complaints. In pregnancy, postpartum or post-abortion period, with excessive sexual activity on the background of alcohol drinking and reduction of immunological reactivity, inflammatory process may manifest Asymptomatic genitourinary trichomoniasis is a serious danger to the sexual partners of patients who did not know about the disease, continue to lead normal life and, thus, become a source of further infection. Clinical manifestations of trichomonas infection depend on the location and severity of inflammatory process. *Clinical manifestations of trichomonas infection in women.* In women the inflammatory process may involve vulva, vagina, urethra, lacunar channels, cervix, uterus and its appendages, large vestibular gland, bladder and renal pelvis. In women, in 95-99% of cases, clinically genitourinary trichomoniasis manifests by affection of the lower region of genitourinary system, vaginitis, which is often combined with an infection of urethra, paraurethral ducts and large vestibular glands. Based on literature data, sometimes Trichomonas could be found in the cavity of the uterus, remote fallopian tubes and rectum. Trichomonas infection in women may be

	asymptomatic, but in a third of these patients clinical manifestations of genitourinary trichomoniasis develop within six months. The inflammation of large vestibular glands of trichomonas etiology is characterized by the appearance of painful formation in the lower third of the labia majora. Clinical manifestations ofTrichomonas vestibulitis are similar to those of gonococcal. In the course of colposcopical examination in a small number of patients with vaginitis (5.2%) there are single-point hemorrhages comparable with strawberries or wild strawberry - a symptom of "strawberry" ("wild strawberry") cervix uteri defined on the mucous membrane of the vagina and vaginal cervical with iodine-negative lesions when stained with 3% Lugol's solution. Clinical signs of the disease appear cyclically and are more pronounced before and after menstruation. *Clinical manifestations of trichomonas infection in men.* In men the inflammatory process involves urethra, prostate, seminal vesicles, bladder and renal pelvis. Thus, T. *vaginalis* spread throughout urethral mucosa, penetrating into its glands and lacunae. Trichomonas urethritis in men is often short-lived, transitory, apparently, due to unfavorable conditions for the existence of parasites in male urethra. In about 40% of case Trichomonas urethritis is complicated by prostatitis, which may run subjectively and without any symptoms for years. In a number of observations *T. vaginalis* causes inflammation of epididymis with tubular degeneration and infiltration of sub-epithelial and interstitial tissue, clinically, running like other non-specific epididymitis. Epididymitis is usually accompanied by trichomonas vesiculitis and/or cowperitis that occur with minimal clinical manifestations. The invasion of prostate with Trichomonas is usually asymptomatic; rarely do they register clinical inflamation in the form of catarrhal inflammation or parenchymal prostatitis. Dissemination of infection from primary lesion (urethra) is usually by transtubular way. As a rule, *T. vaginalis* colonize organs of genitourinary system, but they also can cause ulcers and erosions on the balanus skin in males and vulva mucous membrane in women, hence there is a need for differential diagnostics with other diseases with erosive and ulcerative elements that are characteristic of syphilis, herpes etc. *Clinical manifestations of trichomonas infection in children.* In children, before puberty, genitourinary trichomoniasis is rare. The classic manifestation of genitourinary trichomoniasis in girls is in the form of vulvovaginitis; rarer occur urethritis and cervicitis. Clinical picture is characterized by profuse vaginal discharge, often of frothy nature, accompanied by intense itching and formation of erosions, not only on the mucosa of anogenital region, but also on the inner thighs. Often the course of trichomonas infection is latent, thus the frequency of the child's examination and the use of

effective methods of laboratory identification of *T vaginalis* are of great importance.

Complications of genitourinary trichomoniasis:

In women salpingitis, salpingo-oophoritis, pyosalpinx, endometritis in various combinations;

In men prostatitis, orchiepididymitis.

Diagnostics of Trichomoniasis. The diagnosis of trichomoniasis is set by means of identification of causative agent in biological materials. Today there is microscopic, culture, immunological and molecular and biological methods for the identification of *T vaginalis.*

Microscopic method involves the study of native preparation and smears stained with methylene blue and by Gram's (to simultaneously identify *N gonorrhoeae)* or Romanowsky-Giemsa method. When examining men, they prepare a smear of discharge from urethra or the sediment of centrifuged urine, while with women – they take discharge from posterior vaginal fornix. In chronic inflammatory process the agent can be localized in prostate gland, which requires microscopic examination of its secret. Negative results of microscopic examination should not be regarded as final; the survey should be repeated in 2-3 weeks. On the other hand, epithelial cells, leukocytes and macrophages present in the smears are often perceived as a modified form of *T vaginalis,* which leads to over-diagnosis of trichomoniasis.

Immunological methods combine the methods of direct and indirect immunofluorescence (DIF and IIF).

Molecular and biological techniques involve polymerase and ligase chain reaction (PCR and LCR). They have a high specificity and sensitivity, simple and easy to use and allow detecting in one sample such bacteria as *T vaginalis, Candida spp., Gardnerella vaginalis,* which is essential in case of co-infection of genitourinary tract.

Treatment. The treatment shall be applied to persons who were found positive for *T. vaginal is* regardless of clinical manifestations of the disease and patients who were negative for this type of bacteria, but their sexual partners were positive. The only group of drugs that are effective against *T vaginalis* is derivatives of 5-nitroimidazoles, the antiprotozoal activity of which had been proved yet in 1956. It was in 1960 when Metronidazolum was first applied to treat trichomonas infection. In the following decades there were synthesized analogues of metronidazole and a series of new drugs in this group with high activity against protozoa and anaerobic bacteria has been developed. These drugs include Ornidazole, Nimorazolum, Secnidazole.

Based on modern international guidelines on selection of single-dose and course antiprotozoal drugs to treat patients with trichomoniasis, the preference is given to single oral administration of Metronidazolum or Tinidazolum at a dose of 2.0 g *Alternative techniques* involve prescription of

	Metronidazolum 500 mg orally two times a day for 7 days or Tinidazolum 500 mg orally two times a day for 5 days; Methods of treatment of patients with genitourinary trichomoniasis proposed in Ukraine are as follows: Metronidazolum (Trichopol etc.) 250 mg 2 times a day for 10 days or 250 mg three times a day for the first 4 days and 250 mg 2 times a day for the next 4 days: or 500 mg 2 times a day - in the first day, 250 mg 3 times a day on the second day and 250 mg 2 times a day - on the fourth and fifth days; or 500 mg 4 times a day for 5-7 days (recommended for chronic or complicated trichomoniasis): or 750 mg 4 times a day in the first day, 500 mg 4 times a day - on the second day (recommended for recent trichomoniasis with a small disease duration); or Metronidazolum 500 mg in 100 ml of intravenous solution (by drop infusion) 3 times a day for 5-7 days (recommended for chronic continuous course, frequent relapses, complications of trichomoniasis); 2.0 g single dose of Tinidazolum; Ornidazole 500 mg 2 times a day for 5 days. After inflammation relief you should conduct local treatment that must be justified by uretroscopic survey. Male urethra is washed with solutions of potassium permanganate (1 1000-1:6 000) Rivanolum (1-1 000), Furacilin (1:5 000) Gibitanum (1:5000). Women patients with genitourinary trichomoniasis are prescribed local antitrichomonad drugs in the form of vaginal suppositories or vaginal tablets (Trichopol, Tergynan). Tergynan preparation (vaginal tablets) includes: ternidazol. neomycin sulfate, nystatin, prednisolone. Respective components of Tergynan preparation determine its pharmacological properties. Ternidazol has trichomonicidal, also it is active against anaerobic bacteria, including gardnerellas. Neomycin sulfate is a broad-spectrum antibiotic of aminoglycoside group. Nystatin is an antifungal antibiotic from polyenes group and it is active against *Candida* fungi. Prednisolone is a glucocorticoid with anti-inflammatory action. The indications for use of Tergynan drug (vaginal tablets), except for trichomoniasis, include bacterial vaginitis that is caused by simple pyogenic organisms; vaginitis caused by *Candida* fungi; vaginitis caused by mixed infection (Trichomonas, anaerobic infection, yeast-like fungi). Pregnant women patients with genitourinary trichomoniasis should be prescribed antiprotozoal systemic therapy not earlier than the end of the II - III trimester. In case of diagnosing genitourinary trichomoniasis in women in early pregnancy, you should prescribe specific (antiprotozoal) local treatment by applying vaginal suppositories or vaginal tablets (Trichopol, Tergynan), 1 per day for 8-10 days. **Follow-up examination.** Follow-up examination shall be carried out 7-10 days

after the end of treatment; further examination is carried out twice at an interval of one month. Sexual partners should be treated. Patients should be advised to avoid sexual contact until the end of the treatment and control of laboratory tests.

Prevention. Preventive measures for trichomoniasis are similar to measures for gonorrhea. These include the earliest possible detection and treatment of trichomoniasis, identifying and bringing to examination and treatment of persons who are the source of infection, as well as preventive health screening and health communication among people.

Genitourinary chlamydia infection

Genitourinary chlamydia infection is now the most common among the diseases that are transmitted mainly via sexual contact. The world is witnessing a constant increase in the incidence of chlamydia, particularly among young people who had just entered the period of sexual activity. The prevalence varies widely among different age groups in different regions of the world, but everywhere the disease is much more common than gonorrhea. Slow development of symptoms and often a complete lack of them results in late request of patients for specialized medical care.

Medical and social importance of chlamydia infection is conditioned by high incidence of morbidity and complications that significantly affect the demographics, because Chlamydia infection is the most common cause of male and female infertility.

Etiology. Genitourinary chlamydia infection is caused by *Chlamydia trachomatis*, a representative of *Chlamydiales* order, which includes 4 families, 6 genera and 13 species. Modem classification of microorganisms involves the use of strict criteria of genosystematics to describe various levels of taxonomic groups.

Based on new classification, *C trachomatis* is an obligate human parasite responsible for a wide range of diseases, i.e.. trachoma, genitourinary infections, some forms of arthritis, conjunctivitis and pneumonia of newborns. The structure of chlamydiae cell wall is similar to the structure of gram-negative microorganisms. All chlamydiae are similar in morphology, they share genus-specific antigen presented by lipopolysaccharide (LPS) of the outer membrane of cell wall and a variety of species-, subspecies-and type-specific antigens that are protein in nature and characterized by thermolability.

	Chlamydia elementary bodies are surrounded by tight rigid cell wall, which is separated from plasma membrane by electronically non-transparent periplasmatic space. The cell wall of chlamydiae has typical of gram-negative bacteria two-layer structure: it is composed of proteins, phospholipids and lipopolysaccharides. Unlike other prokaryote, chlamydiae cell wall doesn't contain peptidoglycan that is necessary to maintain its rigidity. Approximately 60% of the total weight of membrane protein makes Omp 1 the major outer membrane protein (or MOMP *Major Outer Membrane Protein).* Molecular weight of MOMP varies depending on the serotype from 38 to 42 kDa. MOMP protein is a dominant antigen of *C trachomatis,* which determines its serotype. At the current stage, as an alternative for determination of chlamydiae, it is proposed to use the analysis of polymorphism of DNA restriction fragment length. This method was called genotyping and serotypes were called genotypes. This analysis allows detecting new subtypes of known serotypes. Serotype F is often associated with damage to the upper genital tract and pronounced clinical symptoms. E serotype is associated with asymptomatic infection or mild clinical signs of infection. Identification of genotypes of more virulent and capable of causing serious diseases of the upper genital tract, may serve a prognostic indicator of complications. The life cycle of chlamydiae has been studied well enough. It provides for the change of two forms of pathogens metabolically inactive extracellular elementary corpuscles (ECs) and metabolically active non-infectious reticular corpuscles (RC). ECs are adapted to extracellular survival. They are the carriers of specific signs of chlamydiae and at the same time represent highly infectious form of the parasite. **Epidemiology.** The source of infection with genitourinary chlamydia is a person with an acute or chronic form of the disease. The main routes of transmission are sexual, contact-household. Given the common ways of transmission of sexually transmitted infections, chlamydia often occur in association with other organisms, such as gonorrhea, trichomonas, mycoplasma, ureaplasma etc. **Pathogenesis.** Chlamydiae are profoundly responsive of columnar epithelium that covers mucous membrane of urethra, cervix canal, rectum, conjunctiva and the nasopharynx. The ability to infection is attributed only to

	EC chlamydiae. The experiments on cultivation of chlamydiae in cell culture have defined that susceptible to infection only those cells whose membrane due to the action of certain factors has lost mechanisms preventing adhesion and intrusion of EC. ECs adhesion on cell membrane and their inside penetration are the first step in the interaction between cells and chlamydiae. By penetrating into the cell, chlamydiae inhibit fusion of lysosomes with phagocytic vacuole. EC penetrate into the cell by pinocytosis, being protected from destruction by phagosome membrane. A few ECS can be present in the cell at the same time, i.e. some groups of chlamydia microcolonies can happen to be in the cytoplasm of cells. Being in the cytoplasmic vacuoles (endosome), ECs consistently across the stage of TC (transitional corpuscles) are transformed in the RCs, which, in their turn, are subject to binary fission. At the end of fission period RCs are subject to reverse transformation into ECs. Newly formed ECs go out the cell, destroying it and infecting new cells. The study of immune responses to this infection showed that a lot of complications are combined with severe destructions of immune regulation. Immune response in chlamydia infection is diverse and is characterized by production of secretory Ig of A, M, G classes, inflammatory mediators (cytokines), such as IFN, IL-1, IL-4, IL-6, tumor necrosis factor etc. The type of disease course depends on human immunity, the massiveness of infection, pathogenicity and virulence of the pathogen, and many other reasons. Complications of genitourinary chlamydia infections are often combined with severe disorders of immune regulation, in particular, with a reduction in the concentration of T-lymphocytes, T-helper cells, lowered IFN-status of the patient. **Clinical picture.** There are the following peculiarities in the course of chlamydia infection in men, women and choldren. *Clinical picture of genitourinary chlamydia infection in men.* In vast majority of cases, chlamydia infection in men is oligosymptomatic. The most common form of the disease in men is urethritis. Based on clinical classification similar to gonorrhea classification there are three forms of urethritis: *recent urethritis* (with disease duration of up to two months), which may occur *acutely, subacutely and torpidly, chronic urethritis* (with disease duration of more than two months, or with unknown duration of illness), runs torpidly, with exacerbations by type of acute or subacute urethritis; *latent chlamydia urethra infection* (singled out by some authors). Recent and chronic urethritis are divided into *anterior*, when columnar epithelium cell. Romanovwsky-Giemsa inflammatory process is limited to the anterior segment of urethra, and *total*, when inflammatory process is spread proximal to the external urethral sphincter. *Acute urethra inflammation* is rare, and the patients are concerned with serous or seropurulent urethral discharge, painful and frequent urination. Even without

	treatment within a few days or weeks acute urethritis symptoms subside, and the inflammation becomes subacute or torpid. In *recent torpid chlamydia urethritis* inflammation, in most cases, is limited to the defeat of the anterior segment of urethra. In practice, the more common are subacute or torpid courses of urethritis, when patients do not complain at all and chlamydiae detection occurs by accident, or complain of a little itchy in the urethra and meager discharge. When examining, you may notice slight swelling and redness of urethral lips. During exacerbation *of chronic chlamydia urethritis* patients' complaints and clinical picture are consistent with recent acute and subacute urethritis, and lesions totally cover the anterior and posterior segments of urethra. Exacerbation occurs after consumption of alcohol, spicy food, sex, exposure to cold or other factors that reduce protective properties of the microorganism. Ureteroscopy in chronic chlamydia urethritis reveals mucosal changes that are consistent with the picture of soft, transitional or solid infiltrate. In *latent chlamydia infection* objective and subjective symptoms are absent; the diagnosis is set on the basis of detection of chlamydia in urethra scrapings. There is possible transformation of latent infection into clinically apparent disease, the cause of which may be associated with concomitant diseases of genitourinary tract with other etiologies. *Genitourinary complications.* The spread of infection on to above areas of genitourinary tract leads to the development of complications, among which a special place is occupied by an inflammation of prostate gland. *Prostatitis* in most cases occurs as primary chronic process. There are four symptoms of this complication - *painful, dysuric, sexual, reproductive.* Each of these symptoms may be the only symptom or manifestation of primary disease. Pain is localized in the perineal area, and irradiation may be in the rump, anus, suprapubic area, urethra, testicles. The intensity of pain varies from paresthesia to the feeling of heaviness and pressure followed by severe pain. Pain may increase with prolonged sitting, bumpy ride, defecation etc. Dysuric symptoms include pollakiuria, dysuria, nocturia, sluggish

	stream of urine, sometimes strangury. Given the fact that all of these symptoms can be observed in BPH, it is necessary to carry out differential diagnostics of this disease in men aged 45 years and older. Dysuria with prostatitis is often caused not only by urethra inflammation, but also it involves bladder neck in the process. The emergence of sexual dysfunction in some patients with changes in the prostate depends on the involvement of adjacent organs (seed tubercle, seminal vesicles) into inflammation process. In this case, even the most minor infractions as rapid ejaculation and certain unpleasant feelings can cause neurotic disorders in the patient, which, in its turn, closes the circle of neurotic symptom complex. Sometimes, chronic prostatitis is latent, when there are no symptoms for years, and the disease manifests itself in copulatory and reproductive dysfunctions or only one of them. This can occur on the background of genetically determined congenital hypoandrogenism. It may however be caused by prolonged inflammation in prostatic acini. Common symptoms of chronic prostatitis include fatigue, weakness, low-grade fever, which is probably due to intoxication and hormonal disorders. Long-term course of the disease, the presence of multiple symptoms, excessive focus on existing problems lead to the development of neurotic disorders. Vegetative local and general reactions lead to the appearance of paresthesias in patients, anorectal itching, perinea sweating. Prostatitis is characterized by alternation of active phases with periods of remission. Without treatment, chronic chlamydia prostatitis can continue for an indefinite period of time. The result of this process depends on its form, state of macroorganism and therapy effectiveness. At a superficial inflammation of the prostate and early treatment a patient can recover with full restoration of function, while in case of late treatment parenchyma is replaced with scar tissue. The spread of contagious agent from the back of urethra through spermduct to the epididymis leads to the development of *epididymitis. Acute epididymitis* is

	manifested by intense pain in the corresponding part of the scrotum, the skin of which is congested, swollen and hot to the touch. The body temperature rises to 39 ° C. When examining epididymis by touch it is defined as a helmet, covering the bottom and the back surface of the testis. The appearance of serous effusion in the egg shell *(periorchiepididymitis),* involvement of testis into the process *{orchiepididymitis)* result in palpation of scrotum organs as a single conglomerate, in which it is difficult to distinguish the egg from epididymis. Spermduct can also be involved into pathological process *{vasitis),* which is palpable in the form of a painful cord. Spread of inflammation to the surrounding tissue of spermatic cord leads to its inflammation *(juniculitis).* Without treatment, within 2-3 days, all the painful events are increasing, and in the next 2-3 weeks they gradually subside, the effusion between shells resolves, but may remain scars in the tail of epididymis, which disrupts the patency of ductuli efferentes. However, impairment of fertility is not always associated with mechanical causes. Immune mechanisms of self-aggression may play one of the important roles in development of infertility. *Extragenital complications.* Among the most frequent extragenital complications are ophtalmochlamydia infection, reactive arthritis that form the symptomatic complex of Reiter's disease, to include pharyngitis and proctitis. A serious complication of chlamydia infection is Reiter's syndrome *{syndromum urethrooculosynoviale).* The disease develops in individuals with a genetic predisposition; it often affects HLA B27 antigen carriers. Men suffer 20 times more often than women. The disease is characterized by combined lesion of urinary organs (genitourinary prostatitis, xerotica balanitis), eyes (conjunctivitis), joints - by type of asymmetric reactive arthritis and skin (psoriasiform rash, keratoderma of palms and soles). The disease usually occurs with repeated attacks and remissions. C. *trachomatis* or its antigens are found in synovial fluid samples obtained from diseasedjoints. ***Clinical picture of genitourinary chlamydia infection in women.*** Chlamydia infection in women is associated with impaired reproductive function and infectious complications in the form of inflammatory diseases of pelvic organs, tubal infertility and ectopic pregnancy. Clinical manifestations of genitourinary chlamydia infection vary from expressed inflammation events to

	asymptomatic carriage. They single out the affection of the lower region of genitourinary tract (endocervicitis, urethritis, paraurethritis and bartholinitis) and ascending infection (endometritis, salpingitis, salpingoophoritis, pelviperitonitis, perihepatitis). The spread of chlamydia from foci located in the lower genitourinary tract, promote abortion and other operations, including extragenital. Often, the process becomes complicated and manifests by the development of infertility. Chlamydia infection is multifocal. In the vast majority of cases, the process is asymptomatic or with poor clinical symptoms and is often associated with other genitourinary infections. In women cervical canal is most often affects than urethra. *Urethritis* in women occurs less often than in men, and due to their anatomy, it is accompanied by less severe symptoms, including slight leukocytosis in microscopy of scrapings from urethra. *Bartholinitis* is an inflammation of large vestibule glands. It is often manifested in the form of catarrh with lesions on mouth ducts only. The development of an acute process with a fever, severe pain and formation of abscess in big vestibule gland, is possible only with concomitant infection with gonococci and pyogenic microbes. *Colpitis* is rare as chlamydia do not breed in the stratified squamous epithelium, and outside the cells, they are sensitive to vagina acidic reaction. Primary colpitis is possible only in case of change in endocrine profile, in women of post-menopausal period, pregnant women and girls. C. *trachomatis* can cause urethral syndrome, characterized by dysuria, pain in the urethra, and sometimes pain in the lower back. Often chlamydia cervical lesions, morphologically, are characterized as follicular cervicitis and erosive affection of cervix. *Endocervicitis* is frequent, the most typical and common manifestation of genitourinary chlamydia infection in women, it is its most common clinical form. However, chlamydia can attack vulva in newborn girls, and vaginal vault in women who have undergone hysterectomy. *Chlamydia cervicitis* is the main source of infection for men and children. Clinical manifestations of cervicitis occur in about 3-4 weeks after infection and are

	accompanied by dysuric disorders. Some women complain of itching and burning in the perineal area, whites and lower abdominal pain. Cervicitis runs with scant mucous purulent discharge, the appearance of inflammatory halo around the external os to form a peculiar lymphoid follicles in the external os *(follicular cervicitis)* and light vulnerability of this site. The discharge from cervical canal macerate stratified squamous epithelium of vaginal part of cervix, thus causing its partial desquamation. The cervix becomes edematous and so-called hypertrophic ectopia appears. A kind of an infected cervix can vary from clinically normal to erosive, with thickened edematous mucosa and lots of mucous purulent discharge. Likewise in other genitourinary infections, genitourinary chlamydia infection in women, besides cervix, affects urethra and paraurethral ducts, to include rectal mucosa. *Proctitis symptoms* develop less than urethral syndrome. Proctitis is characterized by rectal bleeding and absence of diarrhea. Approximately in two thirds of women proctitis is caused by passive dissemination of vaginal discharge, and in a third - because of anogenital contact. Bartholinitis of chlamydia etiology occurs relatively rare. Characteristic of *chlamydia cervicitis* symptoms that can be minimally expressed include: cervical contact bleeding, mucous-purulent discharge from the cervix and pseudoerosions. Due to the close connection of cervical duct and uterine, inflammatory lesions of cervix are almost always accompanied by the appearance of processes covering the endometrium. *Chlamydia endometritis* may occur in acute and chronic forms, when the latter is accompanied by uterine bleeding. Chlamydia endometritis develops slowly. Postpartum and post-abortion periods contribute to the emergence of chlamydia endometritis. Chronic chlamydia endometritis in its pure form is rare; it is often accompanied by chronic salpingitis or salpingoophoritis. Among all of chlamydia genital lesions *salpingitis* attracts due to the frequency of the disease and pronounced clinical symptoms. *Acute salpingitis* is a severe systemic disease. Clinical diagnosis of

	acute salpingitis is relatively simple it is established on the basis of severe pain in the abdomen, pain on palpation, increased body temperature, high leukocytosis, accelerated erythrocyte sedimentation rate. *Inflammatory diseases of pelvic organs* are a group of independent clinical entities, witnessing of the presence of bottom-up process including any combinations of endometritis, salpingitis, oophoritis, tubo-ovarian abscess and pelvic peritonitis. The spread of chlamydia infection in the peritoneal cavity leads to the development of perihepatitis known as Fitz-Hugh-Curtis syndrome. Peritonitis and perihepatitis complicate genitourinary chlamydia infection predominantly in young women. The onset of the disease is sudden; there are sharp pains in the abdomen and in the right upper quadrant extending into the right shoulder blade and shoulder, positive peritoneal signs, fever and intoxication. Fitz-Hugh-Curtis syndrome can occur after such interventions as hydrotubation. Genital chlamydia infection can also occur in pregnant women. The likelihood of adverse pregnancy outcomes and fetus affection in pregnant women depend on the severity of genitourinary chlamydia infection, duration of the disease and the adequacy of treatment. Clinical picture of genitourinary chlamydia infection in pregnant women is the same as that of non-pregnant. ***Clinical picture of chlamydia infection in children.*** A common clinical form of chlamydia in newborns is conjunctivitis (so called *conjunctivitis with inclusions),* non-severe disease, which does not cause much anxiety in neonatologists. The disease is characterized by diffuse conjunctival hyperemia, bonding of eyelids after sleep, no copious purulent discharge. However, in line with conjunctivitis or later in infancy, there appear other clinical forms of chlamydia infection acquired before birth or during the passage via birth canal. These include pharyngitis, pneumonia, vulvitis and vulvovaginitis, urethritis, which are asymptomatic in most cases. **Diagnostics of chlamydia infection.** *Laboratory Diagnostics* of chlamydia infection is of paramount importance because clinical manifestations are non- pathognomonic and much common are atypical and asymptomatic forms of the disease. The development of laboratory methods for diagnostics of genitourinary chlamydia infection is directly associated with understanding of biological characteristics of chlamydiae, their antigenic structure, the pathogensis of infection process caused by this agent, to include the overall progress in the field of diagnostics of infectious

	diseases. The quality of diagnostics of genitourinary chlamydia infection depends on the correctness of taking clinical material, the compliance with terms of its delivery to the laboratory and use of high-quality diagnostic tests. To isolate chlamydiae you should investigate biological materials from different sources, often scrapping smears from men's urethral mucosa and women's cervix and urethra. With the introduction of molecular biology techniques it became possible to study non-invasive clinical samples, such as the first portion of freely released urine in men and vaginal discharge in women. If necessary, study material is taken from the rectum, nasopharynx and lower eyelid conjunctiva. In children you should explore the discharge from lower lid conjunctiva, the rear wall of pharynx, vulva in girls. Based on clinical signs, you may study biopsy and surgical materials. Such methods of diagnostics as culture, immunofluorescence test, PCR, ELISA test are used to study materials obtained from the cervix, urethra, rectum, nasopharynx, conjunctiva, biopsy and surgical materials. To study the first portion of urine and vaginal secretions only PCR is used. Cytoscopical method of diagnosing genitourinary chlamydia infection involves the study of Romanowsky-Giemsa stained biological materials using light microscopy. The criterion for detecting chlamydiae in this case is the presence of Halberstadt-Provazek corpuscles in the cytoplasm of infected cells. Light microscopy makes it possible to find large blue-violet vegetative forms (RC) and small pink infectious forms (EC). Cytoscopical method is widely available, but is effective only for acute forms of infection and requires qualified assessment of cytological picture. In genitourinary chlamydia infection the frequency of detection of Halberstadt-Provazek corpuscles in scrapings from urethra and cervix usually does not exceed 10-12%. *Immunomorphological methods (Immunofluorecsence test, ELISA test)* are based on detection of chlamydia antigenic substance in the epithelium and other tissues. The sensitivity of immunofluorecsence test is 80-90%, while specificity-98-99%. According to various researchers, the sensitivity of ELISA test ranges from 60 to 80%. Immunofluorecsence test and ELISA test are not suitable for the study of materials obtained from rectum, nose, throat, and urine samples.

	One of the most objective methods of chlamydia infection laboratory diagnostics is the isolation of the pathogen from affected tissues in McCoy cells culture *{culture method)*. This method is labor intensive, besides from 1 to 4 weeks is required to get the response. It has been recognized as gold standard all over the world and has one hundred percent of specificity. It should be stressed that, being the gold standard for specificity, the culture method is inferior to the rest by sensitivity. The sensitivity of this method in the study of a sample from cervix makes 75-80%. *Amplification tests* aimed at identifying nucleic acids of chlamydiae, such as polymerase chain reaction (PCR), have a sensitivity of at least 93-96%. Now the most promising and highly sensitive are molecular and biological methods chlamydiae detection i.e. PCR, hybridization reaction, RNA detection, SDA, NASBA, etc. *Serological studies* relate to the subsidiary methods of diagnostics of genitourinary chlamydia infection. They can detect IgM, IgA, IgG in the serum, which is especially important for chlamydia detection in children, in complicated process in adults when the use of other methods of detecting the pathogen or its antigen is impossible, and in mass epidemiological studies. Thus, it should be noted that today there are many different methods for chlamydia infection diagnostics. It is important to choose the most reliable, allowing setting correct diagnosis and to timely carry out and monitor the specific therapy. **Treatment.** The treatment of patients with genitourinary chlamydia infection is subject to general principles of management of infectious patients. The therapy should be integrated and etiologycally, pathogenetically and symptomatically differentiated according to the clinical form of inflammatory process, the nature of affection, the severity and duration of illness. Causal treatment of genitourinary chlamydia infection must meet a number of requirements, in particular to high degree of penetration of antichlamydia drug into the cell, its accumulation and to the ensurance of inhibitory concentration at the point where the agent is localized. To treat patients with chlamydia infection they use such antibiotics as tetracyclines, macrolides and fluoroquinolones.

	The *group of tetracyclines* includes antibiotics that are congenial by chemical structure, antimicrobial spectrum and mechanism of action and that are assigned according to the following schemes: Tetracyclinum and Oxytetracycline orally after meals, 500 mg 4 times per day for 7 or 14 days; Metacyclinum 300 mg four times a day for 7-10 days; Doxycyclinum 100 mg 2 times a day for 7-14 days. *Macrolides* are broad-spectrum antibiotics, which are characterized by the presence of macrocyclic lactone ring in their molecule. There are known natural (Erythromycinum, Oleandomycinum, Josamycinum and Spiramycinum) and semisynthetic (Azithromycin, Roxithromycine, Clarithromycin etc.). Such drugs as Azithromycin Josamycinum, Clarithromycin penetrate well into the various tissues and biological fluids, thus creating high and stable concentration of the drug, which is much higher than in serum. Macrolides are referred to the safest antibiotics due to a minor number of possible side effects. *Fluoroquinolones* are fluorinating derivatives of nalidixic acid, the spectrum of activity of which involves mainly the action of gram-negative bacteria. ***Treatment for pregnant women.*** In compliance with applicable guidelines, the following treatment is proposed: Erythromycinum 500 mg orally four times daily for 7 days; Erythromycinum 250 mg orally 4 times a day for 14 days; Amoxicillin 500 mg orally 3 times a day for 7 days; Azithromycin 1,0 g orally once; Josamycinum 750 mg orally 2 times a day for 7 days. Standard local measures traditionally involve washing, douching (of urethra, vagina) with a solution of potassium permanganate (1:8000) in alternation with instillation of 1.2% Protargolum solution, 1 -2% Collargolum solution during 10-15 days. Officinal local media that have antichlamydia activity include vaginal suppositories and Betadine cream as well as Erythromycinum and Tetracyclinum ointment. **Follow-up examination.** After the treatment of patients with genitourinary chlamydia infection follow-up examination should be carried out not earlier than in 3- 4 weeks. PCR study examination conducted earlier than 10-14

	days after antibiotic therapy, can give false positive results. To control the cure it is desirable to use two methods (culture in combination with PCR or immunofluorescence test in conjunction with PCR), when, at the same time, you may use RT-PCR method and real-time NASBA. Detection of chlamydiae one month after the treatment requires the appointment of a repeated course of therapy with other groups of drugs, the duration of which shall not exceed 7-10 days. **Prevention.** Prophylaxis of chlamydia infection is not significantly different from prophylaxis of other sexually transmitted diseases. First of all prophylaxis shall involve comprehensive and timely treatment of patients, elimination of infection in asymptomatic carriers of the pathogen, detection and qualitative examination of patients -sexual partners, administration of prophylactic treatment, use of condoms, health education of the population and especially high-risk groups.