ALIMENTARY INFECTIONS
GENERAL REVIEW

Alimentary infections represent a permanently serious health, and in their effect also economic problem all over the world. The etiologic structure of infections is wide and includes: **bacteria, viruses, protozoa, and helminths.** The characteristic feature of alimentary infections is the entry of an infective agent into the organism through the digestive tract and the resulting secretion by faeces and urine.

The source of infection is **man** or **animal**, usually at the end of an incubation period, in the course of an illness, but also during convalescence when the infective agent is excreted. Man as a source of infection is involved in various forms of the infection manifestations (he may be apparently healthy) ; it may concern a manifest, latent or atypical form of infection.

Transmission of the infection occurrs **indirectly**, usually through ingestion of contaminated food, water or milk products, or **directly** by contaminated hands when fecal-oral transmission applies. Alimentary infections in our conditions occur both **sporadically and epidemically throughout the year with a higher incidence in the summer months.** An epidemic incidence usually occurrs when basic hygienic rules are neglected in the sphere of personal hygiene and nutrition hygiene: an insufficient water supply,a breach of fundamental sanitary principles and food processing technology, and a disruption of an appropriate technology of food preparation, its preservation, storage and serving.
It is necessary to consider that **not all alimentary infections have in their clinical picture the primary sign, i.e. diarrhea** with accompanying symptoms of various intensity (e.g., parasitic infections, botulism, HAV, etc.). Therefore, it is necessary to take into consideration during epidemiological examination that diarrheal illnesses might be of a non-infective origin due to intoxication or an allergy induced by various substances.

ALIMENTARY INFECTIONS
BACTERIAL ETIOLOGY

Diarrheal diseases form the largest group of alimentary infections and have a very wide etiologic structure and a common characteristic clinical sign - **diarrhea.**
Acute diarrheal disease (ADD) is a clinical syndrome of varying etiology, its main sign is diarrhea often accompanied with fever. Under ADD salmonelloses, shigelloses, infections caused by E.coli, viruses, protozoa, helminths may manifest, but also amebic dysentry, cholera, etc. The same clinical picture is induced by a series of conditionally pathogenic microorganisms. From the epidemiological point of view we can classify ADD into the following groups:

- Epidemical diarrhea of newborns
- Epidemical diarrhea of infants (occurrence in developing countries in non-breast feeded infants)
- ADD affecting the general population - affects all age groups
- ADD connected with travelling abroad

INFECTIONS INDUCED BY E.COLI

E.coli- is a part of the normal intestinal flora in humans and animals. It is an indicator of fecal contamination of water and food. The strains pathogenic to man include 4 main groups:

Enteropathogenic - EPEC (common serotypes: 026, 055, 086, etc.).
The EPEC strains induce illness in pre-term infants, sucklings, and small children. Watery stools without admixtures, often accompanied with vomiting, fever, and dehydration dominate the clinical picture.

Enteroinvasive - EIEC (serotypes: 028ac, 0124, 0143, etc.)
The clinical picture resembles bacillary dysentery: tenesmus, diarrhea with phlegm and blood.

Enterotoxigenic - ETEC (common serotypes: 06, 08, 078, 0128).
The ETEC strains cause diarrhea in tropical and subtropical regions - e.g., diarrhea in travellers who don´t possess antibodies against ETEC. The clinical symptomatology often resembles cholera - **a profuse watery diarrhea with dehydration.**

Enterohemorrhagic - EHEC, 0157:H7 producing verotoxin 1 and 2, shiga-like toxins I and II. The EHEC strains induce bloody diarrhea.

Incidence
The number of reported ADD cases in the Czech Republic ranges from 5 to 10 thousand with a higher incidence in the summer months. The **EPEC** epidemics are usually registered at maternity wards and in groups with a closed catering system (schools, canteens). **ETEC - a frequent incidence in children up to 3 years of age and in travellers with diarrhea.**

Source - reservoir
The sick or the carrier. Cattle may be the reservoir in EHEC.

Route of transmission
A fecal-oral transmission or by contaminated objects. Transmission by contaminated food and water occurs in ETEC, and imperfectly heat-processed meat in EHEC.

Incubation period
EPEC: 9 - 12 hours
ETEC: 10 - 18 hours
EIEC: 12 - 18 hours
EHEC: relatively long, 3 - 8 days

Infectious period
For the duration of E.coli secretion from stools.

Susceptibility
A high susceptibility to EPEC in small children, the infectious dose is low in EHEC.

Therapy principles
Rehydration is of basic significance in therapy, this principle applies also in travellers with diarrhea. A diet with an adequate supply of fluids is usually sufficient in those cases. In principle, antibiotics are not administered.

Preventive measures
- Early diagnosis and notification of cases
- Provision of a safe source of drinking water, a safe disposal of dejecta, a strict observance of personal hygiene, especially after using the WC
- Perfectly heat-processed meat products
- To observe sanitary-epidemiological measures in medical establishments

Measures to be taken
- Notification of the disease, isolation of the sick at home, hospitalization in serious cases
- Active search for contacts, including sampling the faeces, laboratory examination and medical surveillance
- **Exclusion of carriers from the food industry and other epidemiologically consequential activities.**
- A continuous and final disinfection in the infection focus, including faeces, vomitus, and urine, an appropriate therapy.

INFECTIONS INDUCED BY ENTERIC PATHOGENS

a) Bacteria - pathogenic

Salmonella typhi
Gram-negative rods of the Salmonella genus with long-term survival in the environment (water). It is destroyed at temperatures over 80^{o} C; it causes typhoid fever. Antigenic structure: 9, 12, Vi, d.

Salmonella paratyphi A, B, and C
Isolated diseases whose causative agents vary. Antigenic structure types A 1, 2, 12 , B 1, 4, 5, 12, b, 1, 2. C 6, 7, Vi, 1, 5. The disease exhibits slightly or intermediately manifested typhoid fever.

Salmonella species

The most common clinical picture manifests as an acute gastroenteritis with diarrhea, abdominal pain, and elevated temperature. A part manifests asymptomatically, i.e. without clinical signs. They induce acute diarrheal diseases with a short incubation period. Animals are usually the reservoir. The disease is **one of the most common anthropozoonoses.**
In our country these are the most common serotypes:

- **S.enteritidis**
- **S.typhimurium**, S.agona, S.bareily, S.heidelberg, S.panama, etc.

Shigella species
Gram-negative rods sensitive to drying out. The disease is one of the most contagious enteric infections, with a very low infectious dose, usually with a pronounced clinical symptomatology: watery diarrhea with an admixture of phlegm and blood and recurring tenesmus.

Vibrio cholerae
A gram-negative rod sensitive to drying out and an acidic environment, it is a noninvasive microbe which by the action of cholera toxin induces secretion of fluid into the small intestine with diarrhea and vomiting, quick dehydration.

Yersinia enterocolitica serotype 03 and 09, respectively.
It induces alimentary infections. The clinical picture changes according to age. In schoolchildren it induces the right iliac fossa syndrome, i.e. pseudoappendicitis.

Campylobacter jejuni, C.coli, C.fetus, C.laridis
They produce endotoxins similar to cholera toxin. They induce enteric infections in humans and animals. They apply as conditioned pathogens in humans with weakened immunity.

Vibrio parahaemolyticus - they produce a series of exotoxins, formerly named as non-agglutinative vibrios (NAG).

Citrobacter species
Bacteria of low pathogenicity, they induce manifest and latent diarrheal diseases.

Plesiomonas shigelloides - an enteric infection, sometimes similar to dysentery. It usually occurrs in tropical and subtropical regions in surface water; it produces enterotoxin. It induces enteric infections, in some cases even choleriform severe diarrhea.

Aeromonas hydrophyla
It occurrs in water, food, and soil. It produces cytotoxic enterotoxin. The microbe can colonize the human intestine and induce accute diarrhea and chronic colitis.

CAUSATIVE AGENTS OF ALIMENTARY TOXICOSES

Food poisoning induced by bacterial toxins

In our conditions food poisoning is induced most frequently by staphylococci, Cl.perfringens, and B.cereus. Other agents have been identified relatively rarely.

Staphylococcus aureus - staphylococcal enterotoxicosis
Staphylococci are very resistant in the environment, they produce a series of toxins and enzymes. Staphylococcal enterotoxin causes acute food poisoning with a very short incubation period, a dramatic onset and diarrhea.

Clostridium perfringens type A
Type A produces a heat-labile enterotoxin and causes an acute enteric disease with pronounced enteralgia, nausea, and diarrhea.

Clostridium botulinum

Antigenically distinct types A - G produce type-specific heat labile endotoxins. The most common types are A, B and E. It usually concerns preserved food poisoning with a longer incubation period and manifestation of the afebrile cranial nerve paralysis.

Bacillus cereus
It produces two enterotoxins, causes food poisoning with a short incubation period, a sudden onset, colic, and vomiting. It usually occurrs in mass-catering establishments

Clostridium difficile
It produces toxin A. Microbe propagation occurs after suppression of the physiological intestinal microflora. It induces enterocolitis and a pseudomembranous inflammation of the intestinal mucosa with serious consequences resulting in shock development.

VIRAL ETIOLOGY OF ALIMENTARY INFECTIONS

VIRUS HEPATITIS
TYPE A, E

HAV
A virus resistant to the effects of the environment. It causes acute inflammation of the liver, most commonly with gastrointestinal and influenzal symptomatology. Sometimes as an inapparent infection. **The lowest seroprevalence in our conditions is in the age cohort 5 - 15 years.**

HEV
RNA virus is the causative agent of alimentary contagious hepatitis. Man is the only natural host. The infection spreads through oral-fecal mechanisms, especially water. In our country it concerns **mostly imported cases.**

Poliomyelitis
Enterovirus type 1, 2, and 3 is the causative agent. It is very resistant in the environment and survives for some months. It induces both latent and manifest forms of affection with a weak paralysis of the muscles (of the lower and upper extremities). Prevention is based on vaccination; it is liable to obligatory notification.

Coxsackie viruses
Coxsackie viruses A and B induce polymorphous symptomatology affection; with a varied clinical picture of exanthema and enanthema, serous meningitis, etc. They also sporadically induce paretic forms, but they repair quickly. It is necessary to distinguish poliomyelitis in the differential diagnosis. **An etiologic diagnosis is possible on the basis of serological detection.**

Enteroviruses (EV) 68 - 71 (recently described etiologic agents)
They are similar to the coxsackie viruses. In small children they induce pneumonia, bronchopneumonia, and aseptic meningitis.

Echoviruses
They have the typical features of enteroviruses. Man is the exclusive natural host. Most infections manifest themselves inapparently. Type 21 induces catarrh of the upper air passages. Types 4 and 18 induce diarrhea in small children. Types 4, 6, 9, 14, 16 cause aseptic meningitis.

Rotaviruses
Rotaviruses are **one of the most common causative agents of diarrhea in small children aged 6 months to 3 years.** They make up approximately one half of the children confined to hospitals due to acute diarrhea. The incubation period is 1 - 3 days. The disease starts suddenly with a high fever up to 40^{o} C and vomiting. Diarrhea follows (5 - 10x a day) lasting 5 to 10 days.

Norwalk and Norwalk-like
Viruses of this group induce gastroenteritis in all age groups with diarrhea intensity of varied degree. The disease affects rather older children and adults during the winter months. Transmission occurs most frequently through the ecal-oral route. Water-borne epidemics have been reported through foodstuff vehicles and close contact.

ALIMENTARY PROTOZOAL INFECTIONS

Amebic dysentery
The causative agent: **Entamoeba histolytica**. It has the symptomatology of an acute disease with diarrhea and a tendency to chronicity. It occurrs in tropical and subtropical parts of the world.

Giardiasis
The causative agent: **Giardia lamblia syn. Lamblia intestinalis**. It causes an acute and protracted diarrhea with pronounced weight loss.

Balantidosis
The causative agent: **Balantidium coli**. It induces illness which manifests of a severe chronic dysentery.

ALIMENTARY INFECTIONS INDUCED BY HELMINTHS

Taeniosis
The causative agent: **Taenia saginata** (beef tapeworm of man), **Taenia solium** (pork tapeworm, armed tapeworm). The disease manifests with non-specific abdominal discomforts. Diagnostically important is the demonstration of proglottids in faeces or in a smear of the rectum.

Ascariasis
The causative agent is the roundworm **Ascaris lumbricoides**. Ascaris in the small intestine induces digestive discomforts, abdominal pain, vomiting, and possibly constipation, in extreme cases it can also induce ileus.

Toxocariasis
The causative agent is **Toxocara canis** (a common ascarid of dogs) and **Toxocara cati** (a common ascarid of cats). They cause a chronic disease with affection of some abdominal organs with pronounced hepatomegaly, abdominal pain, and vomiting.

Enterobiasis
The causative agent is the seat worm **Enterobius vermicularis**, the human pinworm. The infection often has an asymptomatic course, sometimes only a strong itching in the rectal region, mainly in the evening. Man is the only source of infection.

Ancylostomiasis
The causative agents: **Ancylostoma duodenale** and **Necator americanus**. They induce chronic affection with varied symptomatology and significant nutritional disorder. Sometimes it exhibits dyspeptic complaints.

EPIDEMIOLOGY OF TYPHOID FEVER AND TYPHUS

TYPHOID FEVER

Clinical features and diagnosis
It is a pyrexial disease with a high fever lasting 3 - 4 weeks, when salmonellae propagate, penetrate into the intestinal epithelium and proliferate in the lymphatic tissue of Peyer´s plaques. They penetrate into the blood after breaking the barrier.
Characteristic symptoms - 1st week: a rising fever, dysorexia, nausea, cough.
In the second and third weeks the patient has a fever around 39^{o} C with a daily fluctuation within 1^{o} C (febris continua). The patient has a coated tongue with a V or W shape. Hypotension, hepatosplenomegaly, and a rash - typhoidal roseola are manifested - usually on the abdomen. The patient is weakened, with obnubilation. **In the fourth week** the fever gradually decreases. The disease manifests more mildly in childhood, fever is not so high in the elderly. Complications are more frequent: decubitus, bronchopneumonia, phlebitis, etc.
Diagnosis is usually made on the basis of epidemiological history, the clinical picture, and laboratory detection by S.typhi culturing from the blood (1st week), from stools and urine in the following weeks. From the 2nd week there is a positive Widal´s reaction to O-agglutinin 9, 12, and during the 3rd to 4th weeks to that of Vi antibodies.

Agent

The causative agent is **Salmonella typhi abdominalis**, antigenic structure 9, 12, Vi, d. Nowadays we know 107 phagocytes whose determination is of epidemiological significance. There is a gram-negative rod with a pronounced resistance to the environment, and with **a long-term survival in service and drinking water.** The chlorine preparations apply well during disinfection.

Source - reservoir
Man, the carrier or the sick are the reservoir. A carrier state of salmonella may be intermediate or permanent. In many parts of the world a **short-term intestinal (biliary) carrier state occurs more frequently** than a urinary one. The carrier state originates after experiencing the manifest and latent subclinical forms of typhoid fever. A chronic carriage is observed most frequently in middle-aged females with preceding affection of the gallbladder. Only a few cases of the carrier state were reported in the Czech Republic in 1998.

Route of transmission
It is a fecal-oral transmission through close and indirect contact. Contaminated food, water, milk or other products are the most common vehicles of alimentary transmission. In coastal states infection occurs through ingestion of infected oysters, fresh fruit and vegetables (that have been in contact with contaminated water).

Susceptibility
Susceptibility is general. It is influenced by the general status of the organism. A higher susceptibility occurs in achlorhydria and in HIV-positive persons. After getting over the disease there is permanent immunity. Immunity acquired by vaccination is mostly short-term.

Incubation period
The incubation period depends on the infectious dose; it is usually 2 weeks, but can range from 3 days to 3 months.

Infectious period
The sick person acts as the source of infection from the 1st week until the end of convalescence. The S.typhi route occurs through faeces and urine. In about 10 % of untreated persons the time of salmonella excretion is longer than three months. **A lifelong carriage develops in 2 - 5 % of the sick.** Middle-aged and elderly females with chronic inflammatory alterations of the gallbladder (more than 90%) are mostly affected.

Incidence
A few cases of typhoid fever a year have been reported in the Czech Republic since the mid - 1980s (imported cases from endemic regions). Morbidity is low at present. One case of typhoid fever was diagnosed in 1998. Strains resistant to chloramphenicol and other recommended antibiotics have been reported in some regions of the Middle East and Latin America.

Therapy principles
Chloramphenicol and ampicilin are the causal drugs, with high doses of vitamins and supportive therapy.

Preventive measures
- Provision of a chlorinated drinking water supply.
- Appropriate disposal of human excreta and wastes. Observation of hygienic standards in the production, transport, and storage of food.
- **Active search for carriers of typhoid fever and continual surveillance.**
- An intensified supervision of persons working in the food industry, including imparting the hygienic minimum knowledge.
- Health education of workers in the food industry and food processing.
- To instruct S.typhi carriers how to behave in the family and in public.
- **Preventive vaccination is carried out in families of S.typhi carriers and prior to travelling to risk regions.** More types of vaccines are at our disposal: polysaccharide parenteral vaccine, whole-cell attenuated live peroral vaccine. The polysaccharide vaccine contains Vi-polysaccharide of S.typhi strain TY 2: TYPHIM Vi (Pasteur Merieux). The vaccine is administered in a single 0.5 ml dose i.m. or s.c., with a single booster dose after 3 years. Immunity is acquired after 14 days, the period of protection is 3 years.

Measures to be taken
- Disease notification and isolation of the sick.

- Epidemiological search in the focus and an intensified medical surveillance. Bacteriological examination of faeces and urine during the 3rd, 5th and 7th weeks in convalescents, and during months 3, 6, 9, and 12 to prevent the carrier state.
- A quarantine for a period of 21 days for children´s contacts and persons working in the food industry.
- A continuous and final disinfection of excreta, linen, and a safe disinfection of the hands after use of the WC.

PARATYPHOID FEVER A, B, C

Clinical features and diagnosis
It concerns **three separate diseases.** The causative agents are antigenically diverse, a different source of infection applies, and they have varied clinical course. In our country there most frequently occurrs paratyphoid fever type B, rarely there is imported paratyphoid fever type A. Paratyphoid fever type C doesn´t occur there.
Paratyphoid fever A manifests by a mild to moderately severe **enteric fever**. It is possible to check the illness through isolation of the causative agent from the blood or stools, and serologically.
Paratyphoid fever B - the course of affection is either **typhoid**, when fever is the main symptom, or it manifests itself through **gastroenteritis**, when diarrhea dominates.

Diagnosis is based on clinical symptomatology (the gastroenteric form is the most common) and on culturing S.paratyphi from the blood, stools and urine.A pronounced increase of antibodies against all antigens must be detected for diagnosis of paratyphoid fever. The gastroenteric form resembles other diarrheal diseases, e.g., salmonellosis or dysentery.

Agent
S.paratyphi B - antigenic structure 4, 12, b, 1, 2.
S.paratyphi A - antigenic structure 1, 2, 12 - pathogenic for man. Incidence is most frequent in India, China, and the Arabian Peninsula.
S.paratyphi C - antigenic structure 6, 7, Vi:c, 1, 5, pathogenic for man, antigenically closely related to several zoopathogenic salmonelloses.

Source - reservoir
The sick or carrier is the source in paratyphoid fever A and B, sporadically sick animals and birds in paratyphoid fever B.

Route of transmission
Fecal-oral transmission directly from man to man or indirectly through contaminated food, water, milk, etc. Products of sick animals such as cow´s milk, meat, eggs apply in paratyphoid fever B as the vehicle of infection during imperfect heat-processing.

Susceptibility
It is general. Immunity is acquired after getting over the disease. Immunity after vaccination is short-term.

Incubation period
1 - 10 days.

Infectious period
It lasts from the disease onset until recovery. Excretion of salmonellas through the stools and urine persists for a long time. In the elderly (mostly females) **development of carriage occurs more frequently than in typhoid fever**.
Incidence
The incidence of type B paratyphoid fever has a permanently decreasing tendency as in typhoid fever. Isolated cases of typhoid fever and type B paratyphoid fever were reported in the last ten years in the Czech Republic.

Therapy principles
For the typhoid form it is the same as in typhoid fever. A rehydration therapy is principal for the gastroenteritis form. S.paratyphi B is in vitro more resistant to chloramphenicol than S.typhi.

Preventive measures - the same as for typhoid fever.

Measures to be taken - as for typhoid fever except for the quarantine time.

- The quarantine time for childern´s contacts and persons working in the food industry is for 8 days.

EPIDEMIOLOGY OF SALMONELLOSES

Clinical features and diagnosis

It concerns a bacterial disease - alimentary toxoinfection which usually manifests itself through acute gastroenteritis. It starts abruptly, manifests with nausea, abdominal pain, vomiting, a temperature rising to 39°C, and diarrhea. Diarrhea is without tenesmus or blood. Dehydration or a focal infection - endocarditis, meningitis, pericarditis, etc., may be life-threatening in infants and the elderly. This form is typical for salmonellosis. According to the infectious dose and susceptibility of the affected person the course of the disease varies from mild diarrhea to a severe picture - **cholera nostras**. A prompt rehydration must follow, otherwise insufficiency of the kidneys occurs.
1 - 5 % of salmonelloses may manifest **asymptomatically**, even with a symptom-free secretion of salmonellae at a low infectious dose. In those cases salmonellae go through the digestive tract. Usually no pronounced propagation occurs and secretion lasts only several days. That form doesn´t require therapy.
In persons with a severe principal affection such as carcinoma, diabetes, etc., salmonellosis may manifest itself through a **typhoid form** (1 - 2 %). A high fever dominates and the clinical picture resembles typhoid fever. It may also occur as **salmonellosis with a local manifestation** (1 %). The causative agent is **most frequently S.cholerae suis**. It manifests itself with a high fever and localization of the pyogenic processes in various organs (cholecystitis, endocarditis, and meningitis).
We can make a **diagnosis** on a mass scale incidence according to the clinical picture and epidemiological history confirmed by laboratory **detection of salmonellae in faeces and urine**, especially for the asymptomatic forms. It is possible to carry out the stools sampling using a swab with DC agar or other transport media.

Agent

Salmonellae are enteric gram-negative rods of the Enterobactericeae family. The are resistant to effects of the environment. They have the ability to grow both in the presence and the absence of oxygen. Temperatures over 70°C and use of common disinfectants kill them. Some salmonellae produce a **heat-stabile endotoxin** which induces toxic symptoms of affection.
Classification of salmonellae is based on determination of body O, flagellar H, or possibly capsular Wi antigens. According to the O antigen they classify into the groups designated A and Z. Nowadays we know more than 2,200 serotypes which are pathogenic for animals and man.
The most frequent serotypes which occur in the Czech Republic: **S.enteritidis, S.typhimurium, S.agona, S.infantis, S.hadar, etc.** For identification of strains we use biochemistry, phage typing, the presence of plasmids, and susceptibility to ATB.

Source - reservoir

Infected domestic and wild animals are the primary sources. Infected rodents and birds are other reservoirs. The highest contamination is in cattle, calves,and domestic and water fowl. Since 1989 **poultry** has become a significant source in our country. In addition to meat from poultry, **eggs** are a high-risk vehicle, contaminated not only on the surface by hen faeces but also transovarially (imputed to intensive poultry-breeding, the use of antibiotics, imported components of feeds, etc.). As the source of infection the ill person, convalescent or carrier secreting salmonellae through faeces or urine very rarely apply. On the other hand, a chronic carriage is dominant in animals and birds.

Route of transmission

Transmission of salmonellae occurs through the alimentary route when eating contaminated food. There are two ways of contamination:

a) **Primary** - products are prepared from meat, eggs, and organs of primarily infected animals.
b) **Secondary** - when unexceptional foodstuffs are contaminated during processing, distribution, storage or transport with the salmonellae of animals or man.

Secondary contamination occurs very frequently at intersections of clean and dirty plants in processing products (working surfaces, refrigerators, containers, etc.). The nub of an alimentary transmission in salmonellae is the fact that the transmission takes place through foods which usually have no heat-treatment at higher temperatures (a short time of treatment and a low temperature) and form a very good medium for the propagation of salmonellae. Sausages, liver sausages, paté, white puddings, and dairy products - dried milk, various whipped creams, ice-

creams, etc. are the most frequent vehicles. Recently during the sporadic and epidemic prevalence of salmonelloses egg products(salads, spreads, mayonnaise and pastry, in which a raw yolk is used) and insufficiently heat-treated poultry products (S.enteritidis) have dominated. The infectious dose necessary to induce a manifest disease usually fluctuates in the range of 10^5 to 10^8 salmonellae. In children and the elderly and children it is usually much lower. **Transmission from man to man applies only rarely, namely during gross negligence of personal hygiene** in susceptible individuals - newborns, persons with immunosuppressive therapy, etc.

Susceptibility
Susceptibility is general. It is higher in persons with reduced acidity of gastric juices, in treatments with antacides, after surgeries of the digestive tract, in tumorous diseases, during immunosuppressive therapy and when there is malnutrition. Susceptibility depends on the infectious dose.

Incubation period
It ranges from 12 to 36 hours; exceptionally, it is shorter than 6 hours.

Infectious period
It lasts for the course of the infection and is markedly variable (from several days up to several weeks). A temporary carriage doesn´t affect the secretion of salmonellae, rather, it prolongs the secretion.

Incidence
Salmonella occur all over the world. Since 1952 the incidence in our country has a slightly increasing trend with the first peak in 1981 (146 per 100,000 inhabitants). In 1989 there occurred an explosive growth of salmonelloses which has lasted up to now. 49,045 cases of affection and 1,746 cases of carriage were reported. The highest levels of morbidity rate persist in children one year of age or younger. **S.enteritidis** has become a dominant etiological agent forming 96 % of all bacteriologically proved salmonelloses. Analysis of reported epidemics of salmonelloses demonstrated that:

- Persons in establishments with a closed type of catering (school canteens, kindergarten canteens, and work canteens) were affected most frequently.
- Since 1992 there have been increases in the number of epidemics connected with making food products in private catering services and confectioneries.

Therapy principles
Rehydration and **diet** are overriding in the non-complicated **gastroenteric form**. In a pronounced dehydration it is necessary to administer fluids and drip-feedings. During symptomatic treatment we administer intestinal disinfectants of the Endiaron N type. Antibiotics are administered only in indispensably indicated cases. A surgical dressing of a purulent focus and administration of high doses of antibiotics is preferential in **salmonellae with local manifestation**. Treatment of **a typhoid form** is conducted as in typhoid fever - chloramphenicol or ampicilin are administered.

Preventive measures

- Zoohygienic measures connected with domestic cattle breeding, butcher´s processing, waste waters, etc.
- Health education of food manufacturing industry personnel. A consistent observance of sanitary measures in processing and storage of meat, milk, and egg products; observance of the technology of production.
- **Health education in a wider sense of the term** of all the public concerning personal hygiene, food making and storage of medically unexceptionable foods (eggs, meat products, etc.),a perfect heat-treatment, food preservation in a frozen state or at the temperature of 5 - 8^{o}C. A continuous food protection against insect and rodents.

Measures to be taken

- Notification and isolation of the sick
- Epidemiological investigation in the focus: active search for all contacts, including microbiologic examination of the stools, and more intensive medical control for a period of 4 days.
- Persons working in the food industry excreting salmonellae must be excluded from epidemically risk work when there are three negative results of the microbiologic examination (also applies in cases of family member affection).

- Appropriate disinfection in the foci and continuous disinfection of hands. In children´s pre-school establishments **a more intensive medical control for a period of 4 days** following exclusion of the sick child applies.

EPIDEMIOLOGY OF CAMPYLOBACTER INFECTION

Clinical features and diagnosis

Acute bacterial enteric disease of diverse consequence. It manifests through symptomatology of diarrhea with fevers, colic abdominal pains, nausea, vomiting, and diverse levels of dehydration. Faeces with an offensive odour, often spurting. It can also manifest through colitis, i.e. with fresh blood present in faeces. In a few isolated cases patients are hospitalized for acute abdominal incidence. The disease usually lasts for 3 - 7 days, not longer than 10 days. It is necessary to realize that some diseases manifest symptomatically and are connected with a short-term secretion of campylobacter.

Etiologic diagnosis is confirmed by culture examination (campylobacter jejuni from faeces). The material is sampled from the transport culture media (Cary-Blair, a solidified culture medium with thioglycolate, etc.). It grows on blood agar with an admixture of growth factors and antibiotics; it forms greyish colonies without hemolysis. It cultivates at 42 - 43^{o}C in a medium with 5 % CO_2, usually 48 hours. It is possible to demonstrate the assay of specific antibodies by the ELISA test or in CFR on the 10th day of the disease.

Agent

Campylobacter jejuni - Gram-negative microbe, crescent-shaped (resembles Vibrio cholerae).
Other campylobacter types: C.coli, C.laridis, C.fetus - they participate in diarrhea and extraintestinal infections.

Source - reservoir

Warm-blooded animals are both the source and reservoir - mainly poultry, pigs, sheep, calves, rodents,and birds. Nowadays **poultry** is considered the most common reservoir of campylobacteriosis in our country. **The source of infection may also be man** who excretes C.jejuni in faeces.

Route of transmission

The most common way is through **ingestion of infected products** prepared from imperfectly heat-treated chickens and pigs. They are infected intravitally. The spread of the infection also occurs at contact with puppies, kittens, live birds and sheep.**Contaminated cow milk or water** may be a factor in transmission. **Interhuman transmission** occurs in infants in group establishments.

Susceptibility

Susceptibility is general. After a person falls ill, production of antibodies occurs. Immunity is probably only short-term. Campylobacteriosis has a professional character - in tenders. In developing countries there is a high incidence of campylobacter diarrhea in children two years of age and under.

Incubation period

2 - 5 days, within an interval of 1 - 10 days dependending on the infectious dose.

Infectious period

C.jejuni is excreted in the course of the disease and approximately a week in the convalescence, sometimes even longer. A great epidemiological risk of infection threatens the sick with incontinence of faeces - choleriform diarrheas.

Incidence

Campylobacter jejuni and C.coli are considered serious etiologic agents of acute enteritis since 1972.
In the etiologic structure of epidemic enteric diseases occupies the second position behind S.enteritidis in the Czech Republic in recent years. In 1998 there were diagnosed 5,530 cases of campylobacter enteritis which represents the incidence of 55.3/100 000 inhabitants. The highest incidence is usually reported in the summer months. It is spread in all parts of the world, particularly in developing countries.

Therapy principles

Rehydration and remineralization are analogous with those in choleriform diarrheas. The extent of rehydration depends on the consequence of the clinical course. Aminoglycoside antibiotics, possibly tetracycline or quinolones are administered in extraintestinal dissemination.

Preventive measures
Analogous measures as in salmonelloses.

Measures at occurrence
- Notification, isolation of the sick, hospitalization in serious cases
- Epidemiological investigation in the focus, examination of contacts, exclusion from epidemiologically risky works with foodstuffs, repeated cultivation examination, etc.
- Continuous and final disinfection.

EPIDEMIOLOGY OF BACILLARY AND AMEBIC DYSENTERY

BACILLARY DYSENTERY

Clinical features and diagnosis
It is an acute bacterial highly infectious diarrheal disease affecting lower part of the small intestine and the whole large intestine. Characteristic diarrhea is accompanied with fever, nausea, and vomiting, sometimes with symptoms of toxemia with griping abdominal pains - tenesmus. Due to formation of microabscesses induced by invasive Shigella bacteria, watery diarrheas with admixture of blood and mucus are present in typical cases. The disease consequence is markedly influenced by age, nutrition state, infectious dose and the serotype of Shigella. In the Czech Republic the infection mostly manifests in the form of a mild colitis. An asymptomatic course is also frequent. The disease usually lasts for 4 - 7 days.
Shigella dysenteriae I (Sh.shigae) causes severe affection with manifestation of intoxication with frequent complications. In severe shigelloses there is a risk of quick dehydration of the organism and possibility of the large intestine wall perforation.
Diagnosis is based on the clinical picture at the epidemic incidence and results of epidemiological investigation. Dysentery-form picture may also be in salmonellosis or food intoxication induced by pathogenic microbes, enteroinvasive E.coli, e.g., O 124. Etiology is reliably demonstrated by cultivation of Shigella on DC agar, SS agar and the Endo´s medium.

Agent
Shigella bacteria contain nonmotile, gram-negative, nonencapsulated rods. They are sensitive in the environment, mainly to desiccation and to common disinfectants. The classify into 4 groups according to antigenic and biochemical properties:
A (**Shigella dysenteriae**, 12 serotypes, it occurs rarely in our country)

B (**Shigella flexneri**, 12 serotypes, it induces in our country 10 % of shigelloses as a maximum)

C (**Shigella boydii**, 19 serotypes, mostly imported)

D (**Shigella sonnei**, 1 serotype, it participates in 90 % of shigelloses in our country)

A pecific factor of virulence is plasmid which conditions invasivity into the enteric epithelial cells. All shigellae produce heat-labile toxin except Sh.dysenteriae which produces heat-stable and the strongest toxin. Sh.sonnei strains mostly produce colicins which are used to explain epidemiolgical circumstances.

Source - reservoir
It concerns anthropozoonosis, the source of infection is the sick or convalescent.

Route of transmission
Shigellosis is a typical „disease of dirty hands„. The transmission realizes **directly** or **indirectly** through **fecal-oral route** with contaminated objects. **Water** and **milk** apply in alimentary infection, flies can apply as a mechanical factor.

Susceptibility

Susceptibility is general, infectivity is high. Severe forms occur more frequently in infants, the elderly and severe nutritional disorders. Shigellosis in adults can manifest asymptomatically. Shigelloses usually occur during emergency situations, catastrophes, disasters, armed conflicts, in refugee camps - when it is difficult to observe basic hygiene. The antibody response is low after getting over the disease, and there is no cross immunity among shigella serotypes.

Incubation period
Short, usually 1 - 3 days, 7 days in Sh.dysenteriae I.

Infectious period
Shigellosis is the most contagious bacterial enteric infection. The disease is already induced by the infectious dose of 10 - 200 bacteria. A mass excretion occurs in the acute stage of the disease , in convalescence it continues even for several weeks. An appropriate antimicrobial therapy usually reduces the period of shigella excretion to several days.

Incidence
The cycles of 3 to 4 years featured the morbidity curve in the past. Two peeaks were registered - in 1963 - (325/100 000 inhabitants), and in 1983 (210/100 000). Since 1986 the incidence of shigelloses sharply decreases, the morbidity rate of 5.1/100 000 inhabitants was reported in 1998. An epidemic incidence of shigelloses still occurs in psychiatric houses, children´s camps, and social settlements.

Therapy principles
Rehydration and **diet** are always decisive. In severe cases i.v. rehydration is administered. Hydroquinoline preparations (Endiaron, Endiform) are used for therapy. Antibiotics are not administered in mild forms. In more serious cases we administer ciprofloxacin or ofloxacin.

Preventive measures
- The personnel in food industry and their dependents are liable to a medical check-up when there occurs a diarrheal disease.
- Scrupulous observance of personal hygiene, especially cleanliness of hands, particularly after using lavatory.
- Adherence to sanitary habits in preparation, handling, storage, and distribution of foodstuffs, especially of those preserved in a raw state (fruit, vegetables).
- Safe disposal of human excrement, especially under conditions without sewerage working.
- Protection of water sources, provision of drinking water.
- Serotype-specific live peroral vaccines or parenteral polysaccharide conjugated vaccines are recommended for vaccination in endemic localities. Protection is short-term, usually 1 year.

Measures to be taken
- Disease notification.
- Isolation and treatment of the affected, usually at home.
- Hospitalization in the infection ward only in cases of dehydration and toxic course.
- **Active search for new cases** in the focus who were in contact with the sick. To carry out cultivation of faeces with subsequent follow up, usually for the period of 5 days. To explain the source of infection and route of transmission.

Quarantine measures
- Positive finding of shigella in persons performing epidemiologically significant activity (food industry) is reason for their exclusion from the work process.
- In familial shigella incidence , children are able to attend pre-school and school facilities after 5 days since the last contact with the sick. The sick should be isolated at home for five days only after their first negative examination of faeces.
- To conduct continuous disinfection of hands for the period of 5 days and focal disinfection of all contaminated objects, surfaces, linen, lavatory, etc.

AMEBIC DYSENTERY , AMEBIOSIS

Clinical features and diagnosis

The disease usually occurs in two clinical forms: **intestinal** and **extraintestinal.** It is a protozoal infection induced by cysts or fragile trophozoites. A manifest intestinal form is characterized by profuse diarrhea (up to 30 a day). The fecal material contains pus, mucus, and blood. The disease is accompanied by fever, shivers, abdominal pain in the gastric region, flatulence, and tenesmus.
A serious complication of the enteric amebiosis is the intestine perforation with subsequent peritonitis. The intestinal form may also manifest by a **milder diarrheal disease** with diarrhea and abdominal pains alternating with constipation. The clinical picture in amebiosis is very similar to that of **ulcerative colitis.**The extraintestinal form manifests most frequently with involvement of liver - **amebic abscess.** Abscess in the brain or lungs is of rare occurrence.
Diagnosis of amebiosis is based on **microscopical detection of trophozoites or cysts** in fresh stools or in the material at proctoscopy or from the abscess punctate. It is possible to use culture techniques and a serological detection (ELISA).

Agent
Entamoeba histolytica, induces amebiosis. It occurs in several forms as trophozoite in the form of magna and minuta and as cyst.

Source - reservoir
The source of infection is man in the acute or chronic stage of the disease or an asymptomatic carrier of cysts.

Route of transmission
The transmission of ameba occurs most frequently by fecal-oral route on ingestion of contaminated foodstuffs or water.

Susceptibility
Susceptibility to infection is general. Reinfection is relatively rare.

Incubation period
Usually about 3 - 7 days, several weeks and even months.

Infectious period
It lasts for the whole period of cysts excretion, and may last up to several years.

Incidence
The infection occurs all over the world, especially in the tropical and subtropical regions of a low hygienic standard. Invasive amebiosis occurs mostly in young adults. Spread is known in sexually promiscuous individuals and in homosexuals. In the Czech Republic there were reported 12 cases of affection and 2 cases of carriage in 1998.

Therapy principles
Effective therapy depends on the clinical form. **Metronidazol** is the drug of choice (contraindication in the first trimester of pregnancy). A surgery is usually inicated at occurrence of hepatic abscess.

Preventive measures
- In endemic regions it is necessary to observe meticulous personal hygiene, not to use raw vegetables and fruit that is impossible to peel.
- To reboil water to be used for drinks and foods - cysts are destroyed at the temperature over 50^{o}C.
- A parasitological investigation is necessary for persons on their return from endemic regions.

Measures to be taken
- Obligatory notification of the disease.
- Isolation and treatment of the sick and carriers and application of epidemiological investigation in the family.
- To pay a special attention to the workers in food industry (in case of disease or carriage they are excluded from the work process).

EPIDEMIOLOGY OF CHOLERA

Clinical features and diagnosis

An acute bacterial enteric disease with a sudden onset, profuse painful watery diarrhea, vomiting, cramps in calves, hypotension, and resulting anuria. In untreated cases there occur a quick dehydration, acidosis, circulation failure which results in death even during several hours. In the infection caused by V.cholerae Biovar eltor its course is milder and even asymptomatic. This form is epidemiologically more serious due to a late diagnosis and a possibility of a long-term latent spread. In an epidemic explosive incidence of cholera the mortality may reach up to 50 %. In a appropriate treatment it usually doesn´t exceed 1 %.
Diagnosis is based on a positive epidemiological case history (stay in an endemic region), clinical picture and laboratory examination - **microscopic demonstration of Vibrio bacteria in a native preparation (crescent-shaped vibrios), cvulture of vibrios from faeces, and serological assay of fourfold rise in specific antibodies.** The collected material for culture is placed into test tubes with a transport medium - alkaline peptone water, Cary-Blair medium, etc.

Agent
Vibrio cholerae - Gram-negative rods susceptible to desiccation, acid pH, and common disinfectants.**It usually survives in faeces and water for several days,** in foodstuffs and objects for days to weeks. It is possible to determine 155 O serotypes by the serological typing. The classical cholera is caused only by the serogroup O1 which occurs in two biotypes:

- **Vibrio cholerae Clasica I**
- **Vibrio cholerae Biovar eltor**
  (Occurrence in serogroups OGAWA and INABA)

Cholera may also be induced by strains which don´t agglutinate in O1 serum - **V.cholerae non O1** (NAG vibria). They include strains V.cholerae O 140 and V.cholerae O 139 which produce enterotoxin.

Source - reservoir
The source is only the sick, convalescent, exceptionally the carrier. The individual with **latent course of illness** is dangerous for the people round him.

Route of transmission
The infection occurs **after the ingestion of fecally contaminated water**. The vehicle of infection may also be food contaminated with coastal or river water. A direct transmission from man to man applies only in regions with a low standard of hygiene.

Susceptibility
It is variable, achlorhydria increases risk of infection. A higher susceptibility is in enfeebled children in endemic regions. There is a short-term immunity after getting over the infection.

Incubation period
Several hours up to 5 days.

Infectious period
Man is infectious at the end of the incubation period, in the acute phase of the illness and in convalescence (2 - 3 weeks). A long-term excretion for several months occurs rarely. Tetracycline or other broad-spectrum antibiotic therapy reduces the period of excretion. A long-term intermittent excretion of vibrios is known in chronic biliary lesions.

Incidence
There were several pandemics of cholera in India during the 19th century. Since 1961 cholera caused by V.cholerae El Tor biogroup has spread from Indonesia via Asia into eastern Europe and northern Africa has occurred. In 1993 the total number of illnesses exceeded 375,000 cases (78 countries). In Czechoslovakia cholera occurred in East-Slovakia in 1970. It was probably imported from the Ukraine. In 1986 a cholera case was reported in a man after his return from endemic regions of Egypt. There was an extensive cholera epidemic outbreak in Peru in 1991, caused by El Tor biogroup O1, which spread into neighbouring states. In 1995 there occurred a significant reduction in cholera incidence caused by the biotype O 139. There were 55,275 cholera cases reported to WHO in 1995 - with mortality above 3 %.

Therapy principles

The mainstay of treatment is **rehydration, management of acidosis and hypokaliemia**. With a body weight loss higher than 10 % a day intravenous administration of electrolyte solutions is indicated. Simultaneous tetracycline administration reduces the period of excretion and the rehydration volume.

Preventive measures

- Strict observance of personal hygiene. Health education in individuals travelling to endemic regions, including active **immunization**. The protective effect lasts for about half a year.
- Continuous monitoring of microbiological characteristics of circulating strains of V.cholerae.

Measures to be taken

They are conducted according to the ″Plan of measures in case of a disease liable to the WHO health regulations″ - formerly quarantine diseases.

- Immediate notification of all affections including suspicious ones to the hygienic service
- Isolation of the sick in the infection ward
- **Active epidemiological investigation at the site of occurrence** - a search for contacts, including sampling stool specimens.
- Quarantine of persons who were in contact with the sick. An intensified medical supervision for a period of 5 days from the last contact with the sick.
- Continuous focal disinfection at the site of infection (faeces, vomitus, contaminated objects, etc.)
- Prophylactic administration of tetracycline: 1 g a day for a period of 3 to 5 days.

EPIDEMIOLOGY OF FOOD INTOXICATION

To this group belong the so-called **food poisonings** which are induced by the effect of bacterial toxins produced in foodstuffs prior to ingestion:
Staphylococcus aureus, Vibrio parahaemolyticus
Effect of toxins produced in the digestive tract of man after the consumption of contaminated foods - **Clostridium perfringens type A, Bacillus cereus** (produces two types of enterotoxins), **Vibrio parahaemolyticus**
Alimentary intoxication with **Clostridium botulinum** toxin.
The epidemiology of alimentary intoxications differs from alimentary infections.

STAPHYLOCOCCAL ENTEROTOXICOSIS

Clinical features and diagnosis

It is an **acute food poisoning with a very short incubation period, an abrupt onset, vomiting, nausea, abdominal cramps, and a short, mostly benign, course**. The disease starts from full health and then vomiting occurs followed by diarrhea. Diarrheas have a mostly mild course, they are shorter, the body temperature is not elevated. The disease has a dramatic course, sometimes resembling ″acute abdomen″. The symptoms mostly fade away within 24 hours. **Recurrences are common.**
Diagnosis is based on epidemiological history - the extensive prevalence of a disease after the ingestion of the same food, **clinical picture,** and **laboratory examination -** demonstration of staphylococci in faeces, vomitus, and food, or demonstration of pyogenic affections in persons participating in food making. Phagotyping and gel precipitation are used in microbiological diagnostics of enterotoxin detection.

Agent

Staphylococcus aureus - Gram-positive cocci highly resistant in the environment, they produce a variety of toxins and enzymes. **A heat-stable enterotoxin** produced by some strains induces the disease. A 25-minute boiling is usually sufficient for its killing.
There are five different enterotoxins A - E, type A and D apply most frequently.
Staphylococcal enterotoxin is included in the so-called **superantigen** (Staphylococcus aureus Ag, i.e. the antigen which for its interaction with the immune system doesn´t require antigen processing by presenting cells) group.

Source - reservoir

Man is the source of infection, often the carrier (up to 40 % have staphylococcus producing enterotoxin in the nasopharynx). As a source individuals with pyogenic cutaneous affections (furuncle, panaricium) working in food making often apply.

Route of transmission
The alimentary route when consuming food contaminated with staphylococci and preserved for some time at a temperature **enabling their propagation and production of enterotoxins**. As a vehicle mayonnaise and egg-products, pastry, potato and other salads, cream products, sauces, etc. apply. The clinical presentation of the disease usually corresponds to the amount of ingested toxin.

Susceptibility
Susceptibility is general, recurrences are common.

Incubation period
It is very short: 1 - 6 hours.

Infectious period
None in intoxications.

Incidence
In our country epidemics occur most frequently in public catering establishments, army messes, school canteens, outdoor schooling, children´s camps, etc.

Therapy principles
Peroral rehydration is sufficient for most cases. Hospitalization is rare, in cases when parenteral rehydration is indicated.

Preventive measures
- Appropriate health education of the general public and persons working in the food industry about the principles of handling, transporting, and storing foods.
- Appropriate handling of foods so that no propagation of staphylococci and production of enterotoxins occur
- Storage of raw materials and foods in refrigerators in a frozen state
- Preventive check-ups of persons working with foods, with exclusion of individuals with a positive finding for cutaneous affections.

Measures to be taken
- Notification and isolation at home.
- **Epidemiological examination in the focus** (determining the person, site, scope of exposure, ingestion of a suspicious food) including sampling the suspicious food, stools and vomitus.
- Microbiological examination of swabs and smears in persons participating in the preparation of contaminated foods (carriers and cutaneous pyogenic lesions), including phage typing
- A complete sanitation, disinfection of food industry facilities.

ALIMENTARY INTOXICATIONS CAUSED BY CLOSTRIDIUM PERFRINGENS TYPE A

Clinical features and diagnosis
The disease is possible to characterize as an acute diarrheal affection with an abrupt onset, abdominal pain, nausea and diarrhea. The symptoms usually develop several hours after consuming contaminated food. **The clinical presentation is usually mild.**
Diagnosis is based on epidemiological history and microbiological examination of the stools of affected persons, and suspicious food specimens. The identity of the serotypes is considered as a demonstration of the epidemiological relation.

Agent
Clostridium perfringens, Gram-positive, sporeforming, nonmotile rods. It is a part of the normal intestinal microflora. In the small intestine it produces **heat-labile enterotoxin** of a protein nature. Some strains of Cl.perfringens type C induce **necrotizing enteritis** (cases of severe malnutrition).

Source - reservoir
Cl.perfringens is found in the intestinal tracts of man and animals, and in soil.

Route of transmission
Alimentary - by ingestion of contaminated food in which microbes grow. Epidemics are often connected with imperfect heat processing or repeated warming up of meat meals. **Spores survive boiling temperatures, their propagation occurs in the course of cooling and heating.**

Susceptibility
Most humans are susceptible.

Incubation period
2 - 22 hours, usually 10 - 12 hours.

Infectious period
None.

Incidence
It is generally believed that the number of reported epidemics covers only a fragment of the real morbidity as a run of epidemics manifest as an acute diarrheal illness of unclear etiology. Laboratory detection of toxins and microbes in foods is not so frequent.

Therapy principles
The disease course is usually benign. Improvement occurs within several days of ordinary rehydration treatment.

Preventive measures and measures at occurrence
Similar as in staphylococcal enterotoxicosis except for the search for carriers and persons with cutaneous pyogenic lesions.

ALIMENTARY INTOXICATION CAUSED BY BACILLUS CEREUS

Clinical features and diagnosis
There are two clinical pictures of the disease:
- **A-form**: a very short incubation period, an abrupt onset, nausea and vomiting, it resembles staphylococcal enterotoxicosis
- **B-form**: has a longer incubation period, accompanied by enteralgia, watery diarrhea and vomiting.

Diagnosis is based on isolation of the causative agent in stools, vomitus and the suspect food (at least 10^5 organisms per 1 g).

Agent
Bacillus cereus, aerobic, sporeforming microbe producing 2 enterotoxins:
- **Toxin A** is **heat-stable** - originates from microbe multiplication in food
- **Toxin B** - is produced after multiplication of the causative agent in the small intestine

Source - reservoir
B.cereus is an ubiquitous microbe.

Route of transmission
Through ingestion of a contaminated food, which is usually unsuitably stored after its preparation (in which microbe multiplication occurred at room temperature). As a vehicle vegetables, confectionery products, meat products, etc., often apply.

Susceptibility
Susceptibility is general. Immunity is not known.

Incubation period
A-form: 1 - 5 hours

B-form: 6 - 16 hours

Infectious period
None.

Incidence
The disease occurs relatively frequently in our country. A part of the alimentary intoxications are not reported due to a prompt and mild course. Epidemics usually occur in catering establishments (military, school canteens, etc.).

Therapy principles
A peroral rehydration and diet is usually sufficient as treatment. In a more severe course with protracted vomiting , a parenteral rehydration is conducted.

Precautions and measures to be taken
- Not to store boiled foods at room temperature for a long time, otherwise a massive multiplication of B.cereus may occur.
- Foods must be quickly cooled and stored in refrigerators after cooking.
- Other measures similar to those in staphylococcal enterotoxicoses.

INTOXICATIONS CAUSED BY VIBRIO PARAHAEMOLYTICUS

Clinical features and diagnosis
The disease has an abrupt onset with frequent watery diarrheas, cramps, and vomiting. A pathological process develops in the large intestine (in contrast to V.cholerae). The disease has a benign course. A picture of severe dehydration occurs only in weakened individuals.
Diagnosis is based on isolation of the causative agent from stool and suspect food and on demonstration of an epidemiological connexion, including the serological typing of the strain.

Agent
Vibrio parahaemolyticus, gram-negative, aerobic, motile rods.
Antigenic structure: 12 distinct O antigens and 60 capsular antigens.
It produces **endotoxin.**

Source - reservoir
Sea animals - fish, crabs, etc., are the source of infection in the warm season. In the winter season vibrio survive in sea mud.

Route of transmission
Alimentary
- Associated with fish and fish products **which are not thermally treated**, or by the ingestion of thermally treated but **secondarily contaminated fish**.
- Vibrio multiplication to 10^6 and more at room temperature is the condition for intoxication.

Susceptibility
General.

Incubation period
Several hours up to 24 hours.

Infectious period
None.

Incidence
Vibrio parahaemolyticus occurs in coastal waters of the Pacific and the Atlantic Oceans (infected sea animals - shrimps, crabs). The disease occurs most frequently in Japan, the USA, and in the Caribbean. The disease occurs in our country only sporadically.

Therapy principles
A routine diet and rehydration.

Precautions and measures at occurrence
- Health education with emphasis on handling raw and thermally treated sea animals.
- To keep foods at an appropriate temperature in a refrigerator or a thermal treatment of foods by boiling (to destroy endotoxins).

INTOXICATION CAUSED BY BOTULINUS TOXIN
BOTULISM

Clinical features and diagnosis
Life-threatening intoxication is characterized by affection of the nervous system. The botulinus toxin inhibits release of acetylcholine at the neuromuscular synaptic sites, and induces paralysis of the peripheral nerves. Various health troubles of the digestive tract and an indistinct fever are present at the disease commencement. Only then symptoms of the peripheral nerve affection manifest - **hoarseness, dysphagia, diplopia, ptosis of the eyelid, and accommodation insufficiency**. With the progress of the disease soft palate paralysis and peristalsis afunction (constipation) occur. The clinical picture resembles atropine poisoning.
- **Possible paralysis of the respiratory muscles** threatens the life of the sick. Paralysis of the peripheral nerves burns out at survival.
- **In a wound botulism** production of toxins in the infected wound occurs and symptoms of the digestive tract affection are completely absent.
- **Infant botulism is an infectious form of botulism**. The disease develops after absorption of botulinal toxin elaborated in the digestive tract of an infant who has been colonized with Cl.botulinum. The disease starts with constipation, followed by lethargy, symptoms of nervous system affection, hypotonia, and generalized muscular weakness. Infant botulism was described in the USA as **„hypotonic infant syndrome„** (1976). The clinical symptomatology has a broad spectrum ranging from overlooked symptoms to sudden death.

Diagnosis is based on the epidemiological history, clinical picture - typical neural symptoms, and laboratory detection of the botulinal toxin in food remainders, blood, and fecal specimens of the sick (experiments in mice, for a positive case death within 24 hours). **In infant botulism the toxin is not detected in the serum.**

Agent
Clostridium botulinum, anaerobic, sporeforming, gram-positive rod. A species found in the intestinal tract of man and animals. Anaerobically and at a lower pH **it produces neurotoxin, a heat-labile protein which is destroyed by boiling for several minutes**.Spores are resistant, they are destroyed by boiling at 120^{o}C for 30 minutes.
- Antigenic structure: several types of Cl.Botulinum A - G. **In our country type B mainly occurs.** In North-America it is type A. Type E is diagnosed in fish meat poisoning. Type C, D induce intoxication in cattle and poultry.

Source - reservoir
Spores of Cl.botulinum are found in soil, water, in the intestinal tract of animals including fish. They are found in agricultural products including honey.

Route of transmission
Alimentary

- By ingestion of raw, salted or other preserved food (paté, home-canned meat and vegetables, canned fruits, cheeses, sausages, etc.) **containing spores of Cl.botulinum** consumed without boiling.
- **Home-cooked foods are the most common vehicle.** Manifestation of botulism occurs on a small scale also in tins made in the canning industry (a stewed tomato and capsicum salad with a sausage, rolled anchovy, etc.).
- **In wound botulism** contamination of the injured site with spores and vegetative pathogens of Cl.botulinum occurs, most frequently from faeces of the affected.

Susceptibility
General. The disease severity depends on the toxic dose.

Incubation period

Usually 12 - 18 hours, but may even be several days. It depends on the amount of the ingested toxin. The shorter the incubation period, the more serious botulism prognosis and the higher the mortality.

- Incubation period of wound botulism: 3 - 14 days.
- In infant botulism it is difficult to determine.

Infectious period
The disease is not communicable from man to man.

Incidence
Botulism occurs all over the world. It occurs most frequently as sporadic cases or familial incidence. There are 2 - 3 cases per year in our country. In the period from 1960 to 1995 79 cases (1 death in 1993) were reported in the Czech Republic. Six cases of botulism were diagnosed in 1998. Two cases of infant botulism occurred in our country (1979).

Therapy principles
Prompt administration of a polyvalent antitoxic serum - antitoxins A, B, and E. In aphagopraxia and respiratory insufficiency admission to a casualty department and further supportive treatment is necessary.

Preventive measures

- A strict control of the specified procedures in the canning industry (meat, vegetables, fish tins).
- An appropriate storage of the finished products.
- Elimination of „bombed„ tins caused by contamination of the contents with botulinal toxin and other microbes. The food usually has a changed taste and appearance.
- Extensive health education of the public about the hazards of home-canned foods and the necessity of **boiling tins prior to their consumption** (a 15-minute boiling destroys the toxin).
- In wound botulism observance of the hygienic regimen in wound dressing, in casualty wards, and operating theatres. A careful observance of the principles of disinfection and of sterilization procedures.

Measures to be taken

- Disease notification.
- **Administration of a polyvalent antitoxic serum** (antitoxins A, B, and E) to the sick and to all suspect persons.
- Epidemiological investigation of the family: search for all contacts.
- Necessary hospitalization.
- Sampling biological material from the sick - vomitus, faeces, blood.
- Sampling and laboratory examination of food remainders.

EPIDEMIOLOGY OF ENTERIC PARASITIC INFECTIONS

ENTEROBIASIS

Clinical features and diagnosis
It is enteric helminthiasis whose course is often asymptomatic. In a massive infestation the basic clinical sign is a stubborn pruritus in the perianal area which results in sleeping disorders, loss of sleep. Another clinical manifestation in girls may be vulvitis and formation of pyoderma and eczema in the sites of excoriation. From the gastrointestinal symptoms dysorexia, body weight loss, non-characteristic abdominal pains, restlessness, etc. are present.
Diagnosis is based on the clinical picture and microscopic demonstration of pinworm eggs (application of cellophane tape, a transparent adhesive tape). It is also possible to detect the parasite directly from faeces (sampling with Schuffner´s stick).

Agent
Enterobius vermicularis pinworm (Oxyuris).
A whitish spindle-shaped parasite, males are 2 to 5 mm long, females being 8 - 13 mm long. It parasitizes in the ileum, appendix and ascending colon. Females are excreted in defecation, and partly migrate out of the anal orifice where they lay their eggs in the perianal area. There they embryonate after 4 - 6 hours. Pinworms survive in the environment for about 3 weeks. **The life span is 5 - 13 weeks.**

Source - reservoir
Infected man is the source. Pinworms of animals are not transmissible to man.

Route of transmission
The mouth is the portal of entry.
Direct transmission of pinworm eggs from the anus into the mouth (autoinfection and reinfection) or **indirect transmission** by contaminated bed linen, bed clothing, toys, foodstuffs, and other things.

Susceptibility
General, no immunity is acquired after getting over the infection.

Incubation period
The life cycle of pinworms lasts 2 - 6 weeks (from the ingestion of eggs till the development of mature females).

Infectious period
It lasts **as long as the individual is the host of pinworms.**

Incidence
It is endemic **geohelminthiasis** which affects children of pre-school and school age most frequently. It spreads all over the world. It affects the poor socio-economic strata of the population. About 50 - 90 % of children and about 10 % of adults may be affected in the mild geographic zone. Enterobiasis has a **family character.** Infections in families and children´s groups continue for a long time due to repeated reinfections.

Therapy principles
- Generally it is recommended to treat all the family and children´s group members simultaneously, and to repeat the therapy.
- Prevention is based on observance of hygienic habits with a frequent washing of the hands with soap.

Preventive measures
- A consistent observance of personal hygiene standards - washing hands with soap before a meal and after visiting the toilet.
- Appropriate health education with emphasis on a frequent exchange of bedclothes and linen.

Measures at occurrence
- Notification, treatment of the affected persons and all contacts in the family and group.
- A consistent execution of personal hygiene - washing the perianal area with warm water and soap, to wear tight napkins.

TAENIASIS

Clinical features and diagnosis
The most common signs are non-specific digestive affections, symptomatology is unclear.
- **Taenia saginata** - the tapeworm proglottids are motile and can migrate in the appendix and biliary tract, and induce symptomatology caused by obstruction.
- **Taenia solium:** intestinal and tissue forms. **The intestinal form** with non-specific mild complaints develops in infections with cysts. Proglottids are non-motile, obstruction is unlikely.

The tissue form - cysticercosis occurs after ingestion of eggs. The clinical symptomatology depends on localization and the number of cysts (involvement of the brain and medulla is more serious). It is not present in our country.
- **Hymenolepis nana** - clinical symptomatology of varying intensity
- **Diphyllobothrium latum** - a mostly asymptomatic course. At a low percentage there occurs a vitamin B12 deficiency with subsequent megaloblast anemia.
- **Echinococcus granulosus** -it migrates through the blood to the liver (50 - 70 %) and lungs (20 - 30 %) of the patients. Symptomatology develops in most cases not before several years after the infection.

Diagnosis

In the adult worms **detection of proglottids, eggs or antigen** in faeces or swab. It is impossible to distinguish morphologically eggs of T.saginata and T.solium. A specific diagnosis consists in determination of the scolex type. It is also possible to use specific serological tests.

The causative organisms

Species	Intermediate host	Infective stage for man	Pathology
Taenia saginata Beef tapeworm	Cattle	Adult worm	Rarely symptomatically
Taenia solium Armed tapeworm	Pig	Adult worm larva	Rarely symptomatically ,brain,tissue cysts
Hymenolepis nana Dwarf tapeworm	None	Adult worm	Rarely symptomatically
Diphyllobothrium latum Broad tapeworm	Fish	Adult worm	Rarely symptomatically or B12 deficiency
Echinococcus granulosus Hydatid tapeworm	Dog	Larva	Tissue cysts

Source - reservoir

The first or mediating hosts in most cases are insectivora or herbovira infected by eggs of worms through contaminated water or food. The eggs of worms mature in the intestinal tract in the invasive form, penetrating into the host tissue (bovine cysticercosis). **Man is the definitive host for T.saginata, T.solium, D.latum.** The intermediate hosts are carnivora or omnivorous mammals, possibly fish. E.granulosus - the definitive host - canidae, the intermediate host - sheep, goats, horses, and man. **H.nana is only the human parasite.**

Route of transmission

T.saginate - transmission by ingestion of poorly thermally treated **beef or veal containing cysticerci.**
T.solium - by ingestion of thermally untreated **pork** containing cysts, or by ingestion of eggs. Autoinfection is also possible.
H.nana - transmission through the fecal-oral route.
D.latum - by ingestion of poorly thermally treated freshwater fish.
E.granulosus - infections after ingestion of a food contaminated by eggs which are excreted by dogs; a direct contact is also possible.

Susceptibility

Susceptibility to the infection is general. In E.granulosus taeniasis **children are most frequently infected**. The experienced infection doesn´t acquire resistance against recurrent infection.

Incubation period

Depends on the type and life cycle of the parasite. For T.saginata and T.solium it ranges from 8 to 14 weeks, for others in the range of weeks to months. In E.granulosus it takes up to several years.

Infectious period

T.saginata is not transmitted from man to man. Transmission is possible in T.solium. The infectious period is bound to the period of egg excretion - for the whole life of the parasite in the intestinal tract (sometimes even decades). Infectivity in H.nana lasts even several years. The disease caused by E.granulosus is not transmissible from man to man.

Incidence

Worldwide incidence . Mainly in countries with a habit of consuming raw or poorly processed beef or pork and their products (Latin American countries, South-East Asia, Africa, and Eastern Europe). 63 cases of taemiasis, with the highest incidence being in the age group 35 - 44 years were reported in the Czech Republic in 1995. 67 cases were reported in 1998.

Therapy principles

A single administration of anthelmintics.

Preventive measures

- Careful washing of hands before a meal and after defecation.
- **Adequate thermal treatment of beef and pork and their products** (freezing beef and pork at 10^{o}C for 5 days).
- Education of the public **to prevent fecal contamination of the soil, water and foodstuffs for man and animals.**
- **In T.solium infection instantaneous specific therapy** (occurrence of cysticercosis) is necessary which protects the sick against autoinfection with T.solium eggs and contacts against potential infection.

Measures to be taken
- It is liable to notification.
- Epidemiological investigation - search for contacts.

ASCARIASIS

Clinical features and diagnosis
The infection manifests mostly clinically inapparently. Symptomatology depends on the scope of infestation. It is possible to define 2 groups in dependence on the infection development and the site of pathologic lesions.
A pulmonary form is caused by migration of A.lumbricoides larvae in small vessels in the lungs and their subsequent penetration into the alveoli. Cough, fever, dyspnea, and **transient pulmonary infiltrates** dominate in the clinical picture**.**
An intestinal form is induced by large numbers of parasites in the small intestine. It may cause passage obstruction or migration of the worm in preformed paths of the biliary duct tract, appendix or pancreatic duct. Severe manifestations occur most frequently in children in the tropics.
Diagnosis is confirmed by demonstration of ovoid eggs in fecal smears. An early diagnosis is difficult in the pulmonary form (absence of eggs in faeces).

Agent
Large roundworm Ascaris lumbricoides is the etiological organism. The disease occurs after the ingestion of mature larvae containing eggs. Larvae develop from eggs, they penetrate the intestinal wall and through the blood circulation they migrate to the liver and lungs - alveolar sacs. Then they are expectorated and swallowed again. The whole cycle lasts about 60 days.
Toxocara canis, Toxocara cati - the dog and cat ascarids induce **toxocariasis**. The course of infection is chronic.
- **Visceral form** - affection of the liver
- **Pulmonary form** - bronchopneumonia
- **Ocular form** - granulomatous affection of the retina

Man is a non-specific host. The parasite doesn´t complete its biological cycle. **Dogs and cats are the source for man.** The infection is transmitted through the oral route - infection of children at sandpits and playgrounds.

Source - reservoir
Man, soil contaminated with eggs of ascarids.

Route of transmission
The infection results from the ingestion of eggs which survive in soil contaminated with human faeces. The transmission may also result from the ingestion of poorly cooked food containing eggs. The disease **is not directly transmissible from man to man**.

Susceptibility
Susceptibility to infection is general. The experienced infection doesn´t induce resistance against recurrent infection.

Incubation period
Depends on the life cycle of the ascarids. The complete cycle lasts 4 - 8 weeks.

Infectious period
An individual is infective as long as the mature females survive in the intestinal tract.

Incidence
It is geohelminthiasis which occurs all over the world. In the tropical regions of Asia and Africa the prevalence reaches up to 50 % - mainly in children aged 3 - 8 years. In the Czech Republic there is a prevalence of about 170 cases a year - mostly in children aged 1 - 9 years (157 cases were reported in 1998). The highest incidence is reported from the North Moravia region.

Therapy principles
Mebendazole is used for therapy of the intestinal forms. The pulmonary form is treated symptomatically.

Preventive measures
- The primary measure is improvement of socio-economic conditions and observance of personal hygiene during trips to regions with a high prevalence.
- Consistent washing of vegetables contaminated with soil and their subsequent thermal treatment.

Measures to be taken
- Obligatory notification of the disease.

ANCYLOSTOMIASIS

Clinical features and diagnosis
Ancylostomiasis falls into the class of a tropical geohelminthiases. The clinical signs are most frequently anemia and non-specific digestive complaints (nausea, anorexia, vomiting, diarrheas). The severity of the clinical course depends on the number of parasites penetrated into the organism. Chronic infection of children may result in hypoproteinemia.
Diagnosis is based on microscopic demonstration of eggs in fresh faeces.

Agent
The disease is caused by hookworms:
- **Ancylostoma duodenale**
- **Necator americanus**
- **Ancylostoma ceylanicum**
- **Ancylostoma caninum**

Source - reservoir
Necator americanus and Ancylostoma duodenale - man is the source of infection. Invasive larvae survive in the moist environment for several months.
Cats and dogs are the reservoirs in **Ancylostoma ceylanicum and Ancylostoma caninum** infections.

Route of transmission
Man is **usually infected in the moist environment,** after repeated contacts with water or soil containing larvae which **actively penetrate the skin onthe legs or hands**. The route of the parasite in the organism is the same as in ascarids. **The infection may result from bathing or the ingestion of contaminated water.**

Susceptibility
General.

Incubation period
Depends on the scope of infection, usually 7 - 8 weeks.

Infectious period
The disease is not directly transmissible from man to man. Untreated individuals may contaminate the environment, mainly soil. **Larvae in the soil remain infectious for several weeks.**

Incidence
The disease occurs in the tropical and subtropical zones. It is one of the commonest helminthiases.In our conditions of a mild zone it mostly has a **professional character** (tunnel disease).

Therapy principles

Anthelmintics - levamizole, mebendazole, etc., are recommended for therapy. In severe cases the therapy is repeated and stool specimens are continuously examined.

Preventive measures
- A close attention is paid to persons returning from endemic regions of incidence.
- In our country , to provide hygiene in underground work places (to prevent contamination with human faeces and to provide ventilation - decreasing temperature and humidity)

Measures to be taken
- Obligatory notification and early commencement of therapy
- Epidemiological investigation of the infection source

VIRAL HEPATITIS

In the viral hepatitis group several infections are included which are primarily caused by hepatotropic viruses: HAV, HBV, HCV, HDV, HEV, HGV
They manifest a similar clinical picture due to inflammatory and degenerative alterations in the hepatic parenchyma. But the epidemiological features are different. There is no cross-protective immunity among individual hepatitis viruses. The picture of the hepatic tissue alteration is induced also by a series of other etiologic agents, e.g., cytomegalovirus, herpes viruses, leptospires, and other bacterial and parasitic agents.

EPIDEMIOLOGY OF VIRAL HEPATITIS A
Clinical features and diagnosis
Acute inflammatory liver infection

Gastroenteric and influenzal symptomatology is exhibited most frequently. It manifests with fever, anorexia, nausea, and abdominal pains. Symptoms of affection of the joints and skin are less common. The disease has a varying course, from a **light form**, lasting 1 - 2 weeks, up to a **severe fulminant form**, which may even result in death. Clinical expression of the disease in children is very often asymptomatic. The disease has a mild course, often without jaundice. HAV infections don´t convert in a chronic stage, they repair after symptomatologic treatment. The severity of the infection increases with age. Specific mortality in HAV is less than 1/1000 patients; in the over 50 age group it reaches 27 per 1000 patients.

Diagnosis of HAV
It is usually based on epidemiological history, the clinical picture, laboratory biochemical findings and serological examination. In an acute stage we detect **anti-HAV of the IgM class** in the serum, the antibodies **survive for 5 - 6 months from the disease´s onset**. Commercial ELISA and RIA kits are used for detection.

Agent
Hepatitis A virus (HAV), Picornaviridae family, Hepadnavirus genus, (**RNA virus - 27 nm).** It is inactivated in an autoclave, killed by 5 - 7-minute boiling, chlorine preparations, and acetic acid.

Source - reservoir
The infected man or carrier. Chimpanzees are susceptible to infection, but natural foci have not been reported yet. Animal hepadnaviruses (ducks, squirrels, etc.) are HAV -relative.

Route of transmission
- **Direct:** via the fecal-oral route from man to man, in familial, institutional settings; children´s groups, and various communities incl. i.v. drug abusers who are the source for their environs.
- **Indirect**: through contaminated water, food, objects possibly, blood rarely.

The virus is present in stool 1 - 2 weeks before manifestation of symptoms. Positivity quickly falls with the appearance of hepatic dysfunctions and the anti-HAV increase. A common vehicle of large epidemics was contaminated water or food. The source of infection was personnel handling with food distribution, sale or preparation (preparation of sandwiches, salads, poorly cooked sea molluscs, etc.).

Susceptibility

General. Immunity after experiencing HAV is of lifetime duration. Manifest HAV in toddlers and pre-school age children exhibits a low incidence.

Incubation period
15 - 50 days dependending on the infectious dose; average period is 28 - 30 days.

Infectious period
Epidemiological trials and the experience of epidemiologists and clinicians confirm that the highest infectivity is in the second half of the incubation period and during the first days of jaundice or at positive demonstration of aminotransferases (ALT, AST) in anicteric cases.
The virus is present in faeces 1 - 2 weeks before and 1 - 3 weeks after the disease onset.

Incidence
Global. Both sporadic and epidemic with a tendency to be cyclic. In developing countries with a high endemicity, the immune state already occurs in infancy. Children up to 5 years of age are infected up to 90 %. In comparison with adolescents and adults the disease manifests asymptomatically. In industrial countries a marked decrease in HAV incidence has occurred during the last decade. Seroprevalence decreased more than 20-times. Therefore, the percentage of children and young people susceptible to HAV exposure gradually increases. On average, about 1,000 cases of viral hepatitis A - 10/100,000 inhabitants were reported in the Czech Republic in the last 5 years. As a consequence of this favourable trend in the sickness rate development the percentage of the susceptible population increases. This status in the population is favourable for outbreaks of smaller or larger epidemics. In our country **the number of infections in persons with a risk behaviour and the number of imported cases of hepatitis is increasing.**
Risk groups:
- Travellers to endemic regions
- Army personnel on missions abroad
- i.v. drug addicts
- Romany (gypsy) ethnic group
- Some groups of medical personnel
- Homosexuals, heterosexuals, prostitutes

Real risk of HAV in the Czech Republic:
- Most of the population is not protected against HAV- **Antibody prevalence in children and teenagers reaches 4 - 14 %**. The highest incidence of HAV is from 5 - 9 years, then 1 - 4 years, and 10 - 14 years.
- Children are the source for other family members and schoolmates. Severity of infection increases with age; over 50 years the mortality rate reaches 1.8 %.
- Increased severity of imported HAV in travellers to endemic regions: the Russian Federation, South-East Asia, Middle East, South America, etc.
- The incidence of HAV infection in unprotected travellers is 1000 x more frequent than in cholera, and 100 x more frequent than in typhoid fever.**Active immunization is fully indicated in those cases.**

Therapy principles
Symptomatic treatment, especially with exclusion of fats and increased carbohydrates, vitamins, and proteins.

Preventive measures
- To provide a clean drinking supply (water chlorination) and food protection against potential contamination
- Safe control of blood donors - prevention of parenteral transmission

Active and passive immunization
Pre-exposure vaccination
It is recommended for travellers and other risk groups (see above). After vaccination a sufficient immunity already develops after 4 weeks. We now have at our disposal a series of licensed inactivated vaccines of the same standard.
- HAVRIX (SKB) 1440 IU, 720 IU for children.
- VAQTA, MerckSharp-Dohme
- EPAXAL Berna
- AVAXIM Pasteur Merieux

HAVRIX is one of the most frequently used vaccines in the Czech Republic.

- HAVRIX 1440/ADULTA - for the **vaccination of adults** 18 years and over. The basic vaccination: a 1 ml/dose, administered i.m. into the deltoid muscle; booster injections after 6 - 12 months.
  HAVRIX 720 Junior Monodose - for the **vaccination of children and adolescents** aged 1 - 18 years.
  The basic vaccination: a 0.5 ml dose is administered i.m. into the deltoid muscle. Immunity exhibits after 2 - 4 weeks. Antibodies after one dose survive 1 year. The second dose is administered in the range of 6 - 12 months to reach a sufficient level of antibodies. Immunity persists for 10 - 20 years.

Postexposure vaccination
It concerns **an early vaccination** of persons at risk in an epidemic (**aimed at interruption of the epidemic process).** The advantage is a prompt increase of antibodies already after two weeks, protective titres are reached in approximately 96 % of cases. The vaccine was successfully used and interrupted the epidemic spread in Alaska, USA, Košice, Slovakia (1994 - Dr.Príkazský) and in the Czech Republic in 1996 and 1997. It was successfully used during floods in 1997.

Passive immunization
When it is not possible to vaccinate travellers in the endemic regions in time, it is recommended to administer prophylactic doses of Imunoglobulin Norga. For a sojourn lasting 2 - 3 months, Ig is administered in the volume of 0.02 ml per 1 kg of body mass or 2 ml to adults. For a longer sojourn the dose is repeated every fourth month.

Measures to be taken
- Disease notification, an early diagnosis and **isolation of the sick in the infection ward**
- **Epidemic measures in the focus:**

  - Elimination of fecal contamination of water and food
  - To determine the route of infection, the source and number of the exposed persons
  - Continuous disinfection, intensified medical surveillance for a period of 50 days from the isolation of the sick
  - Exclusion of persons carrying out epidemiologically significant activity for a period of 40 days (except persons with positive anti-HAV-IgG titres)
  - **Passive or active immunization of contacts**

VIRAL HEPATITIS B

Clinical features, carriage and diagnosis

The disease has a more severe course than HAV, with digestive tract affection symptoms (nausea, vomiting, acholic stool, affection of joints or the skin surface - evanescent rash with a progressive jaundice. Without fever or only with a mildly elevated temperature.
The severity of HBV is variable, **ranging from inapparent forms** diagnosed on the basis of laboratory disturbancies of the functional tests, **to fulminant cases** of acute hepatic necrosis. The mortality rate in HBV patients fluctuates around 1 %; it is markedly higher in persons over 40 years of age.
In newborns and pre-school children hepatitis B **has a predominantly asymptomatic course with an evident progression to a chronic carrier state** (90 - 95 %). Therefore, only a small part of cases are diagnosed in the acute stage. In children it is less than 10 % and in adults 30 - 50 %. In the case of an icteric course HBV **has an asymptomatic course in approximately one-third of adult cases. Another third manifests as an influenzal disease without jaundice** and in the last third it manifests as viral hepatitis with typical symptoms: fatigue, nausea, anorexia, right upper quadrant pain, an increased quantity of bilirubin, and ALT increased 10 times and more. In 5 - 10 % of cases there is a tendency to convert to chronicity with subsequent cirrhosis or hepatocellular carcinoma development.
Immunity develops in some patients, others become chronic carriers.
The progression of HBV disease in chronicity depends on the continuity of replication in the liver and on the immune response of the sick.Latency manifestations between chronic disease and carcinoma symptoms last for 30 - 45 years. The highest incidence is reported in endemic regions where there is the highest prevalence of perinatal infections.

HBV carriage
HBV in newborns and infants has a predominately asymptomatic course with an evident **progression to a chronic state:**

The carrier state in newborns

- Asymptomatic course 90 - 95 %
- Chronic carriage 70 - 90 %
- Chronic disease of the liver 30 - 50 % (primary cirrhosis)
- Primary carcinoma of the liver

Age of children - relationship to HBV persistent carriage probability

Age	**% of carriers**
< 1	70 - 90 %
2 - 3	40 - 70 %
4 - 6	10 - 40 %
> 7	6 - 10 %

(According to Comm.Dis.Series No.1, 1996)

Adult carriers

- Asymptomatic course 60 - 70 %
- Chronic HBV carriers 6 - 10 %
- Chronic disease of the liver - cirrhosis and carcinoma

Diagnostic HBV markers

Acute infection

Diagnosis of HBV is made on the basis of case history, the clinical picture, biochemical assays, and confirmed by the finding of specific antigens and antibodies in the serum, the so-called markers of HBV:

- **HBsAg and anti-HBsAg antibodies**
- **HBcAg and anti-HBcAg antibodies**
- **HBeAg and anti-HBeAg antibodies**

They are determined using ELISA and RIA in the serum with the exception of HBcAg (detection only in the liver).

HBsAg - detection in the serum several weeks before and after the disease onset. **It persists 6 months**. After this time its possibility testifies to a chronic carrier state: asymptomatic carriage and chronic hepatitis B.

Anti - HBc - appears at the disease commencement. It persists for various times. The finding of anti-HBc-IgM is significant for acute HBV. Usually it disappears within 6 months from the disease commencement.

Anti-HBc IgG positivity is the sign that hepatitis B has been experienced.

Anti-HBs positivity:

- A consequence of the disease experienced
- Successful active immunization
- The hyperimmune globulin HBIG, disappears 3 months after administration.

HBeAg - positivity is a sign of viral replication together with the positive titres anti-HBc and HBV-DNA.

DNA-polymerase - is not routinely performed.

DNA - determination using the PCR method is of significance in monitoring viremia.

Chronic HBV infection

HBsAg - persistence for 6 months in the blood means chronic carriage development (symptomatic or asymptomatic)

HBeAg - positivity is connected with high infectivity - the virus replication with high titres anti-HBc and HBV-DNA.

Agent

Hepatitis B virus, HBV, Hepadnavirus, the so-called Dane particle with a core (formed by DNA, DNA polymerase, and a nucleocapsid protein with the hepatitis B core antigen (HBcAg) and a coat of hepatitis B surface antigen (HBsAg)). The whole virus is infectious with a diameter of 42 nm.

- **HBV virus is not primarily cytopathogenic.** The liver alteration occurs due to immunoalteration of the infected hepatocytes.
- **Australia antigen** - designated as HBsAg. It was discovered by Blumberg et al. In 1963 in patients with the hepatitis serum.
- **HBsAg** is not infectious, but is the sign of the virus presence and its replication. It is found in blood in the form of spherical and tubular particles. It has several principal subtypes with an uneven geographic distribution.
- **HBsAg subtypes:** adw, ayw, adr, ayr.
- The stability of the virus in the environment is relatively high. The virus is inactivated by boiling within 2 minutes, it is sensitive to disinfectants (peroxides, chlorine preparations, glutaraldehyde, peracetic acid, etc.)

Source and reservoir
The sick or carriers. Chimpanzees are susceptible to infection. Relative to HBV are animal hepadnaviruses (ducks, squirrels, marmots) which don´t induce disease in humans.

Route of transmission
Parenteral transmission - blood, blood products and inoculation of the infectious material are of principal significance in the transmission.
- Professional risk to medical personnel (injury by needle - transmission in 7 - 30 %, contaminated instruments, blood transfusions - transmission in 90 %).
- Nosocomial infections - dialysis centres, hemophilia, etc.
- i.v. drug addicts - injury during tattooing, possibly other minute injuries of the skin and mucosa.

An important factor is transmission by **sexual intercourse** in homosexuals, bisexuals, and prostitutes. The infection occurs through mucous membranes - vaginal secreta, menstrual blood in HBV carriers. **Sexual intercourse is the main infection route in regions with a low HBV endemicity** (14 - 40 % of sexual partners acquire HBV).
Vertical - perinatal transmission from mother to child when the mother is the virus carrier or the sick person. About 95 % of newborns infect intranatally and 5 % intrauterinely.
Horizontal transmission is frequent in small children and adolescents in developing countries: Asia, the Middle East, Africa (dermal lesions, scabies, minute injuries, insect bites, etc.). A fecal-oral route has not been proved in HBV. In about 35 % of all cases it is not possible to prove the route of transmission.

Susceptibility and resistance
Susceptibility is general. **HBV is 100-times more infective than the HIV virus.**Clinical expression is milder in children, often asymptomatic and with a very frequent transition to chronicity. Conversion to chronic hepatitis occurs more frequently in individuals with hypoimmunity (Down´s syndrome, lymphoproliferative diseases, HIV infection in hemodialyzed persons and hemophiliacs).

Incubation period
Usually 50 - 180 days, on average 90 days. The variable time is related to inoculum size and the route of HBV transmission. The shortest one was reported 2 weeks after HBsAg appeared in the serum, and the longest one reached 6 - 9 months.

Infectious period
All persons who are **HBsAg positive are potentially infective**. The blood from volunteers experimentally inoculated with HBV proved to be infectious several weeks before the onset of the first symptoms and as such persisted for the whole time of the acute clinical course. The transition from acute phase to chronicity depends on the age of those affected. In newborns it is seen in 90 %, for 1 - 5 years of age it is seen in 25 - 50 %, and in others in 1 - 10 %. The infectiosity of HBV persons increases with high values of HBeAg antigenemia.

Incidence
Viral hepatitis B is **disease with global distribution**. It is estimated that two billion of people have positive HBV markers, that 350 million are of chronic HBV carriers, and about 1 million people die (WHO 1998). The prevalence of carriers reaches 8 - 20 % in countries with high endemicity. A low endemicity is reported in western and northern Europe. The percentage of HBV carriers is less than 1 %. In Germany and France it is 0.1 - 0.5 %. The HBV infection occurs markedly more frequently in risk group persons. In endemic regions of Africa and Asia children are mainly affected. **In industrial nations the highest incidence is in adolescents and adults.** During the last 5 years there have been reported on average in the Czech Republic 680 - 800 cases of infection - i.e. 8/100,000 inhabitants/year. Morbidity was 3 times higher in the first half of the 1980s. A marked increase

occurs in persons over 15 years of age, the highest is in those older than 65 years. The reduction of hepatitis B in the Czech Republic occurred due to vaccination of the risk groups opened by the medical personnel vaccination.

Surveillance
It is based on control of the incidence, prevalence and monitoring effectivity of HBV preventive programmes in individual countries. The reporting of HBV cases both by clinical and laboratory personnel is incomplete due the asymptomatic course (results in underestimated prevalence). Experts presume that hepatitis B numbers in **adolescents and adults are in reality 3 x higher.** Therefore, it is important to perform seoprevalent studies in selected risk groups. Knowledge of the prevalence of HBV markers is important for the rational practice of preventive programmes.

Therapy principles
A complex symptomatologic therapy in chronic infections - administration of alpha-interferon and lamivudine. The therapy successfulness in clinical forms of HBV reaches about 30 - 40 % (reduction of HBV replication, HBV-DNA level and remission of inflammatory alterations and a decrease in ALT values).

Preventive measures
- Health education - **to emphasize the extent of risk**
- **Observance of epidemic measures in medical establishments.**
  - Handling biological material and contaminated instruments, consistent disinfection and sterilization, application of single-use needles and syringes, use of closed hemodialysis systems, smoking and drinking in workplaces with biological material is forbidden.
  - **Postexposure prophylaxis** - passive and active immunization
  - **Examination of blood-donors** - exclusion of HBsAg carriers from blood donation
  - Designation and inspection of sanitary-epidemic measures in non-medical establishments (hair-dressing salons, barber shops, etc.)

Active immunization in persons with a high risk of infection (stated by public notice). The immunization upon payment is not limited.

ENGERIX - B (SKB), a recombinant vaccine
ENGERIX - B 20 μg (1 ml/dose) - for persons over 15 years of age
ENGERIX - B 10μg (0.5 ml/dose) - for newborns and children up to 15 years of age
The primary vaccination is carried out in three doses in 0, 1, and 6-month regimens, i.m. into the deltoid muscle. The accelerated regimen: 0, 1, and 2-month or day 0, 7, and 21, i.m. into the deltoid muscle. **The booster injection is a single dose after 5 years.**
A protective effect is acquired one month after the third dose - about 97 % of vaccinees.
Passive immunization
HB immunoglobulin is for passive immunization. It contains a higher percentage of anti-HBs antibodies. Its use started in the 1970s.
It is administered immediately after the exposure to HBV, the protective effect of the **postexposure prophylaxis lasts 3 - 6 months**. The best effect is after administration within 48 hours to 1 week after the HBV exposure (sexual partners, injury by a needle, etc.). A dose of 0.5 - 1 ml HBIG is administered i.m. to newborns whose mothers are HBV carriers, namely as soon as possible after the delivery. In adults it is administered in a dose of 5 ml i.m. soon after exposure.
The strategy of routine vaccination against HBV has already been discussed . The vaccination of newborns and adolescents and their inclusion into the national vaccination programme is considered. **It is a recommended strategy of WHO in regions with a low HBV endemicity.**
A combined vaccine against hepatitis A and B is licensed in the Czech Republic at present.
TWINRIX - Twinrix Adult for immunization of adolescents and adults over 16 years of age
Twinrix Paediatric - for immunization of children and adolescents from 1 to 15 years of age.

Basic vaccination - administration of 3 doses in 0, 1, and 6-month intervals after the first dose.
In adults 1 ml is administered i.m. into the deltoid muscle.
In the paediatric vaccine 0.5 ml is administered i.m. into the deltoid muscle.
Booster injections - a booster dose against hepatitis B after 5 years, against hepatitis A after 10 years after the basic vaccination. The antibody titres already reach the protective values one month after the second dose of Twinrix.

Measures to be taken

- Notification and early diagnosis
- Isolation of the sick in the infection ward
- **Epidemic measures in the focus:**
  - A continuous disinfection, quarantine measures for a period of 180 days after the isolation of the last sick people Examination of persons susceptible to HBV within three days, then after 90 and 150 days since the last contact with the sick.
- Transfusion centre - examination of donors whose blood was used for production of blood derivates which were administered 6 months before the infection.

VIRAL HEPATITIS C

Clinical features and diagnosis

Anorexia, nausea, vomiting and non-specific complaints of a dyspeptic nature are present at the disease manifestation. **For the most part HCV progression is inapparent** - 75 %. Icterus develops less frequently than in hepatitis B. In approximately 25 - 60 % of the **chronic active hepatitis** may develop, and in about 5 - 20 % **cirrhosis and hepatocellular carcinoma.**
Diagnosis is based on **determination of anti-HCV antibodies** in the second generation EIA test or ELISA. Antibodies can be detected 12 weeks - 6 months after infection. The demonstration of HCV viremia by RNA detection using PCR is applied as a confirmation test of the antibodies´ positivity.

Agent
Hepatitis C virus is a RNA-virus measuring 50 nm. It is classed into **a separate genus, Hepacavirus of the Flaviviridae family.** A series of HCV genotypes have been detected so far. The clinical-epidemiological features of individual genotypes have not been fully investigated.

Source - reservoir
Man. Hepatitis C virus was experimentally transfered to chimpanzees.

Route of transmission
Parenteral transmission. Sporadically, vertical and sexual transmissions were reported.

Susceptibility
Susceptibility is general. Recurrent infections with HCV were reported even in a positive assay of the antibodies.

Incubation period
In the range of 2 weeks to 6 months, **usually 6 - 9 weeks.**

Infectious period
Long-term in viremia, chronic infections.

Incidence
Global incidence with a parenteral route of transmission. A high HCV incidence is found in Japan, Africa, the Middle East, and southern Europe. Before the examination of blood donors for anti-HCV antibodies, hepatitis C was the most frequent cause of post-transfusion hepatitis.
About 120 - 200 cases of acute HCV are reported yearly in the Czech Republic. Anti-HCV prevalence in blood-donors reaches about 0.5 %. A higher prevalence is found in i.v. drug addicts, hemophiliacs, hemodialyzed persons, sexual partners, and medical personnel.

Therapy principles
Symptomatic therapy, alpha-interferon is administered in indicated chronic forms , possibly in combination with antiviral preparations.

Preventive measures

- The same as for HBV, exclusive immunization.

Measures at occurrence - notification, isolation of the sick in the infection ward

- **Quarantine measures for a period of 150 days,** medical examination of persons in contact within 3 days, then after 30 and 90 days since the last contact with the sick. Other measures as in HBV.

VIRAL HEPATITIS D

Clinical features and diagnosis
Occurs in coinfection with HBV or as a superinfection of persons with chronic hepatitis B.
The symptomatology is similar to HBV. In of coinfection it has a two-phase course. In superinfection there is a high risk of conversion to a fulminant form and to chronic active hepatitis with subsequent cirrhosis.
Diagnosis of hepatitis D is confirmed by a positive assay of the anti-HDV antibodies, determined by ELISA or RIA methods.
- Detection of anti-HDV IgM and antigen HDAg is performed only in special laboratories.

Agent
Defective RNA virus, HDV and the DELTA agent, propagating in the presence of the hepatitis B virus. Particles reach a size of 35 - 37 nm. It doesn´t propagate separately in the cells.

Source - reservoir
As in viral hepatitis B.

Route of transmission
Parenteral and sexual as in viral hepatitis B.

Susceptibility
Individuals susceptible to HBV or carriers of HBsAg.

Incubation period
In the course of all phases of infection and before the disease onset.

Incidence
There is endemic incidence in South America, Africa, in Italy, Romania, etc. There is a negligible prevalence in the Czech Republic at present.

Therapy principles
As in viral hepatitis B.

Preventive measures
As in HBV, including immunization of susceptible persons.
- Both active and passive immunization do not protect HBsAg positive carriers.

Measures at occurrence - as in hepatitis B.

VIRAL HEPATITIS E

Clinical features and diagnosis
The clinical symptomatology is similar to HAV. In the prodromal phase gastrointestinal and influenzal symptoms are more markedly manifested. In approximately 30 - 50 % of infected persons the **HEV course is asymptomatic**, including reinfections. **A conversion to chronicity has not yet been demonstrated as in HAV.** A fulminant course of HEV is attributed to a generalized autoimmune reaction.

Diagnosis is made on the basis of the clinical picture, epidemiological history, and **serological examination - assay of anti-HEV antibodies** using commercial kits. Anti-HEV antibodies usually disappear within a year.

Agent
Hepatitis E virus, HEV, the Calcivirus family, the Hepevirus genus, RNA virus - 32 nm (single-strand RNA). It exhibits a high resistance in the environment, especially in water. Two strains exist. It is possible to detect them in faeces in the early stage of acute inflammation of the liver.

Source - reservoir
The sick. **Some facts bear witness to animal reservoirs.** It is possible to infect animals with hepatitis E virus, e.g., chimpanzees, some other species of monkeys, pigs, etc.

Route of transmission
The fecal-oral route, most frequently by water, but also from man to man.

Susceptibility
It is not known. **More than 50 % of hepatitis E infections have anicteric course**. The number of icteric cases increases with age. In women there is a risk of a fulminant course in the third trimester upon HEV affection . There is no explanation for the high incidence of HEV in young adults in regions with high prevalence of other enteric infections affecting infants.

Incubation period
15 - 60 days, in epidemic prevalence most frequently 4 - 6 weeks (26 - 42 hours).

Infectious period
Not exactly determined. The virus is detected in faeces of the sick 2 weeks after manifestation of icterus.

Incidence
Both sporadic and endemic HEV prevalence occur in geographic zones with a low standard of personal and institutional hygiene (India, Iran, Bangladesh, Pakistan, the Russian Federation, China, Indonesia, etc.).
Epidemic prevalence is usually connected to floods and a subsequent fecal contamination of water supplies.
HEV doesn´t occur in the Czech Republic, but as an imported disease in persons returning from endemic regions, it can´t be excluded.

Therapy principles
A complex-symptomatic therapy.

Preventive measures
As in viral hepatitis A, exclusive immunization.

Measures at occurrence
As in viral hepatitis A, exclusive administration of immunoglobulins.

VIRAL HEPATITIS G

Clinical features and diagnosis
The clinical picture is similar to HCV with a very mild course. While an anicteric course in HCV is seen in about 70 %, it is the rule in HGV. Both prompt and slow recoveries, persistence and chronic carriage have been reported. Persistence of HGV RNA was observed for at least 1 year. An **increase in ALT is sometimes the only sign of hepatitis.** Up to now the relationship of normal hepatic tests to carriage or dormant phase of the disease is not fully known. The probability of progression to cirrhosis is very low.
Laboratory diagnostics - at present **the only specific test is a highly sensitive PCR amplification of the individual primers**, independent on the sequence. The method has already been used in the Czech Republic. The ALT values in HGV patients are approximately half of those in HCV. The positivity of HGV RNA in blood donors is reported in the range of 1.5 - 1.7 %.

Agent
HGV is classed in the flavivirus-like group. It contains two flaviviral sequences, relative but different from HCV. The affinity to the hepatitis C virus is possible to express by 26 % - homology of aminoacids. In 1995 three other causative agents of HGV were identified: GBV-A, GBV-B (probably tamarin viruses), and GBV-C which can infect humans.

Source - reservoir
Man is the source. It can also be tamarin, Cynomoltus, macaca monkeys or chimpanzees.

Route of transmission
Typically parenteral with a dominant transfusion mechanism. Viremia may persist for months to years.

Incubation period
It is probably similar to other types of parenterally transmissible hepatitis. Valid data is not yet at our disposal .

Incidence
Probably global. **Relatively frequent is a dual incidence of HGV infection in chronic HBV or HCV** (seen in about 6 - 10 %). A higher prevalence of dual infections is reported only in i.v. drug addicts and homosexuals (50 - 67 %) and in repeated receptors of blood transfusions (21 %).

Therapy principles
Alpha - interferon was repeatedly tested in dual infection cases. After a decrease or clearance of HGV RNA in the course of treatment, or after its completion the initial values are restored.

Preventive measures and measures at occurrence
In accord with other hepatitis types having parenteral mechanism of transmission.

EPIDEMIOLOGY OF POLIOMYELITIS

Clinical features and diagnosis
The disease in most cases (about 90 %) manifests inapparently or as a non-specific pyrexial affection. The highest incidence of inapparent forms is in infection in infancy, i.e. in pre-school and school age. The virus penetrates the digestive tract, propagates in the lymphatic system and excretes through faeces. In the digestive tract passage local and antibody immunity occur.
In part of the infected children, poliomyelitis manifests through **aseptic meningitis** without flaccid paralyses. A paretic form develops very rarely, in about 1 % of the infected. The pyrexial phase of poliomyelitis is followed by manifestation of flaccid asymetric pareses of the skeletal musculature of the lower and upper extremities. **Paralyses are persistent, without sensation disturbances.** The extent of paralyses depends on degeneration of the segment of neural cells in the medulla oblongata or the brainstem. Lower extremities are usually more afflicted than the upper extremities. Impairment of some muscle groups may persist for many years (the nuchal and dorsal musculature), it is designated as „**post polio syndrome**„. The life threatening complication of the paretic forms is **paralysis of the respiratory and swallowing muscles.** The mortality rate in paretic forms reaches 2 - 10 % and markedly increases with age.
In regions of high endemicity, e.g., the central and southern parts of Africa, poliomyelitis is diagnosed on the basis of the clinical picture. In countries where it has been eradicated, it is necessary in the differential diagnostics to differentiate from paretic forms diseases of other etiology and to confirm recovery of the virus from faeces.

- **Other enteroviruses**, e.g., 70 and 71, ECHO viruses, Coxsackie viruses may simulate a paralytic form of poliomyelitis. In these cases affection of the muscles is milder and pareses gradually repair.
- **Polyradiculoneuronitis, Guillain-Barré syndrome (GBS),** intoxications, meningitis and meningoencephalitis of infectious etiology. Further, it is necessary to differentiate in the differential diagnosis acute poisoning with insecticides, botulism, infectious neuropathies and polymyositis.

Laboratory diagnostics
It is based on virus **recovery from faeces, nasoipharynx or liquor - at the exitus from the brain of the deceased.** It is important to determine the wild and vaccination strain using typing and determination of the antigenic relationship of the recovered poliovirus with the vaccination strain. Serological investigation is performed by determination of neutralization antibodies in the pair sera. The dynamics of the rise or fall is evaluated. **Simultaneous positive virological and serological findings are significant for the final diagnosis of poliomyelitis.**

Agent
Poliovirus is classed in the group of enteroviruses type 1, 2, 3. Type 1 induces most commonly paretic forms of poliomyelitis - sporadic and epidemic incidence. Type 2 is rarely recovered in paretic forms. Type 3 sporadically induces severe pareses.

Some isolated vaccination strains very rarely indeed induce the clinical picture of poliomyelitis (most frequently the type 2 and 3 strains). The risk of affection induced by administration of oral poliovirus vaccine (OPV) is one case per 700,000 vaccinees, i.e. per 2 800 000 doses. It concerns mostly immunodeficient individuals who are unable to produce antibodies or have a cellular immunity defect.

Source - reservoir
Man only. Most commonly persons with inapparent infection, or possibly a person vaccinated with a live vaccine. A long-term carriage has not been confirmed.

Route of transmission
Most frequently the fecal-oral route; at the disease climax, also through a droplet transmission mechanism.
Indirectly - by contact with contaminated objects, foods, water, milk (vehicle). The virus propagates in the lymphatic tissue of the pharynx and intestine. In viremia it penetrates the CNS where it dominantly affects the motoric cells of the anterior medullary cornua.

Susceptibility
General. After getting over all polio forms (inapparent and manifest), a type-specific longlife immunity develops. **A physical load, tonsillectomy and injury at the end of the incubation period and in the prodromal stage increase the risk of flaccid pareses.** A higher risk of the paretic forms of development is also in women in the later stage of pregnancy. It increases the risk of abortion or early labour. Manifestation of paralyses in infected non-immune adults is higher than in non-immunized sucklings and infants.

Incubation period
Most commonly 7 - 14 days; it is reported from 3 to 35 days.

Period of infectivity
It is impossible to determine exactly, but transmission is possible as long as the vorus is excreted.
- It is possible to detect the virus in the nasopharynx after just 36 hours and in faeces 72 hours after the exposure to infection in clinical and inapparent forms. The virus persists in the nasopharynx for about a week, it is excreted by faeces for a 3 - 6 week period and longer.
- The infectious individual is the most contagious several days before and after the disease onset.

Incidence
Global incidence. Due to the immunization programme practice, a gradual elimination of poliomyelitis was reached in some countries. A number of nonvaccinated persons met poliovirus at a more advanced age and the percentage of the manifest forms was higher in them.
Polio has been liable to obligatory notification in the Czech Republic since 1919. Only the number of the dead was reported in the beginning, the number of the sick has been reported since 1928. Until the end of 1956 14,243 cases of poliomyelitis affections were reported of which 1,575 ended in exitus. The highest mortality rate was reported in infants up to 1 year of age.
A regular obligatory vaccination started in our country in 1960 using a live vaccine. The last affection with a paretic form of poliomyelitis was reported in the second half of 1960. At present the highest incidence of poliomyelitis is in the Indian subcontinent and in the countries of central and western Africa. A high risk of an epidemic incidence is imminent mainly in countries destroyed by war.
There is a **threat of imported cases** in our country. An pidemic poliomyelitis outbreak at a religious sect refusing vaccination in the Netherlands in 1992 and 1993 can serve as an example. Most of the polio cases in the advanced countries have been induced by vaccination strains of poliomyelitis. In the USA there are 5 - 10 cases altogether in connection with vaccination (yearly registration). About one-half of the cases are reported in adults who came in contact with vaccinated children.
Poliomyelitis still remains the disease of sucklings and infants in endemic countries (70 - 80 % to three years of age, 80 - 90 % to five years of age).

Risk groups
- Susceptible persons refusing immunization
- Minority ethnic groups in the population
- Refugees, the urban poor

Therapy principles

A casual therapy doesn´t exist. In paretic forms - a complex care to prevent the origin of deformities, hot packs and a systematic rehabilitation is followed.

Preventive measures
In the Czech Republic a vaccination with a live attenuated oral trivaccine OPV is used.
The primary vaccination is with two doses of an interval of 2 months in children aged from 10 weeks to 18 months. The booster injections are 12 months after the first dose, again 2 x (15^{th} - 17^{th} months of life). The fifth dose is a booster at the age of 13 . After the vaccination the production of serum antibodies and the induction of a local immunity in the portal of entry occurs.
The reported risk of paralytic affection induced by OPV administration is one case per 700,000 vaccinees. In most cases it concerns individuals with immunodeficiency. Adults are more threatened by a paralytic affection after OPV vaccination than children. **OPV must not be administered** to persons with immunodeficiency, hypogammaglobulinemia, HIV, when there is therapy with corticoids and immunosuppressants. It must not also be administered to individuals who live with other persons suffering from a marked immune system disorder.
Inactivated poliovaccine type Salk (IPV). This vaccine contains all three types of poliovirus. It is prepared by cultivation on the human diploid cells (highly immunogenic). The vaccination regimen: to children in the 3^{rd} month of life 3 injections are administered at intervals of 1 - 2 months, a booster dose after one year. Non-immunized adults are vaccinated with two doses at 1 - 2-month intervals, and the third - a booster dose after one year. The vaccine is administered i.m.

- **Indication for IPV vaccination:**

Persons with hypoimmunity, the dependents with hypoimmunity, adults at risk of poliomyelitis - a partial vaccination. Further on, to individuals refusing OPV and persons with a long-term (6 months - 1 year) postponement of the OPV immunization due to contraindication of diarrhea.

Measures at occurrence

- **Obligatory notification of a suspect case**, isolation in the infection ward until making tthe final diagnosis.
- Sampling the material for laboratory examination. In paretic disease cases, stool specimens are sampled 2 x at 24 - 48 hour intervals in the period from two weeks till the commencement of paralysis.
- Epidemiological investigation in the infection focus, continuous disinfection
- An intensified medical control in contacts for a period of 30 days since the last contact - a daily medical control with clinical examination (including thermometry).
- In harmony with the International Commission of WHO **cases of flaccid pareses in persons up to 30 years of age are followed in the Czech Republic.**

DISEASES TRANSMITTED BY DROPLET INFECTION
GENERAL REVIEW

Diseases of the air passages form a wide range of diseases of various etiology. In the time of seasonal incidence of respiratory infections they are **the cause of high morbidity connected with disablement.**

General features
The primary feature is localization of the infectious process (or only at a certain stage of the disease) in the air passages. It corresponds with the presence of the infectious agent **and subsequent air-borne transmission by droplets**. The way of the onfectious agent outlet(i.e. liberation from the site of affection in the air passages) occurs through the secreta of mucous membranes, and the upper air passages are most frequently the portal of entry.

1. **Typical respiratory infections**

The infectious process is localized at the site of penetration or the infectious agent deposition. We can class into this group **influenza, rhinitis, adenoviroses, pertussis, diphtheria, tuberculosis, etc.**
In some nosologic units the infectious agent gradually spreads from the upper air passages in the lower parts of the respiratory tract, e.g., in **bronchitis, bronchiolitis, bronchopneumonia** induced by adenoviruses and the RS virus.

2. **A group of diseases** where the infectious agent from the site of primary lesions penetrates in the later phase of the infectious process into the depth of the affected tissues. Penetration of the agent into the depth usually has no effect on the epidemic process, e.g., in parotitis or meningococcal meningitis.

3. **Group of diseases with symptomatology of the air passages:** affection may in further development of the infection induce characteristic alterations on the mucosa membranes and the skin surface,e.g. children´s exanthematous diseases.

Transmission of the infectious agent

The infectious agent from the affected mucosal surfaces discharges into the environment through droplets of phlegm and secreta, when coughing and speaking.

a) By droplets of aerosol particles containing the microbial agent

A high reflex irritability of the air passages, i.e. repeated coughing and sneezing helps the transmission.During sneezing and coughing, hundreds of thousands of particles spread round the sick. The infectious aerosol droplets (5 - 10 μm) quickly dry up and gradually settle down. Droplets around 10 - 100 μm enter the air passages and sediment in the nasal cavities and on the posterior wall of the nasopharynx..

Particles of 0.5 - 3 μm reach the lower air passages. In normal breathing (without tachypnea or hyperpneua) 20 - 55 % of the inhaled particles settle down in the air passages. Defects of the ciliary epithelium in the air passages, e.g. in smokers enable the capture of aerosol infectious particles.

b) By contaminated dust particles

The exhaled aerosol particles settle down round the sick on various objects (bed linen,the floor, etc.). The liquid phase of the aerosol dries up and dust particles remain, colonized by microbes which further survive. At swirling of dust, they come again into the air, and form a **secondary infectious solid aerosol** which can for varying times contain pathogenic germs resistant in the environment (the causative agent of diphtheria or tuberculosis).

c) Infection by droplet nuclei

After the evaporation of particles of a size around 10 μm , a reduction of their size occurs and then they behave as a solid aerosol. In residual humidity, they enable the survival of the microbial agents.

d) Sporadically the infectious agent liberated from the air passages reaches an injured skin surface or enters the digestive tract where it can induce pathological lesions (erysipelas, staphylococcal enterotoxicosis, etc.).

Epidemiological characteristics

Manifestations of the air-borne infections have some specific signs.

a) High incidence

Respiratory infections are **the most common infections in man** due to the ease of transmission . Some of them are very often recurrent in the course of life (**influenza, rhinoviruses, RS virus, adenoviruses, etc.**).

A crucial factor is the **crowding of susceptible persons** into a confined space. The following act as supportive factors of epidemic development: duration of the stay, inadequate air exchange - insufficient ventilation, various degrees of immunity, a cold, an increased excretion, a reduced C vitamin level, etc.

b) Seasonal character of incidence

Mostly a typical seasonal incidence caused by a difference in the exposure of individual susceptible cohorts. The weather influence is indirect - it influences the way of life of people. In pre-school children the highest incidence of acute respiratory infections is during the spring months. In school children and in military groups it is in the autumn months.

c) Periodic incidence

Some infections occur in periodic waves that are dependent the rising susceptible generation (e.g., in chicken-pox, parotitis, and measles). A nation-wide immunization markedly influenced their epidemic process in our country. Changes in **group immunity:** after the epidemic wave burns out, the population acquires immunity, the number of susceptible persons decreases, the exposure reduces and the epidemic burns out. **Formation of a susceptible population group** is a prerequisite for the origin of a new epidemic wave. Duringe the interepidemic season the causative agent preserves itself in the population through circulation in the chain of sporadic diseases. The m**igration of persons and the antigenic structure of the causative agent** influence this process. Influenza type A is a typical example.

d) Incidence in childhood

The highest incidence of acute respiratory infections occurs in pre-school and school age children. It enables **an easy and mass way of transmission. A** further factor is the **immunological immaturity of children**. Acquired antibodies from the mother protect the newborn only for a period of some months. In measles and chicken-pox it is about 1 year. Markedly there applies a high exposure and contagiosity which is influenced by the carrier state, the time of excretion of the agent, and its resistance in the environment.

Principles of respiratory infection prevention

- A decisive factor is the status of group immunity in the population
- Rational prevention is based on an **increase of specific resistance by active immunization**. A nation-wide immunization in our country resulted, for example, in elimination of diphtheria, pertussis and measles.

- Isolation of the sources, exposure limitation, a ban on visits to hospitals and large public gatherings. In schools it results only in limitation of the development of the epidemic process.
- The source of infection is most frequently the sick, a carrier or animal (Q-fever, bovine TBC, etc.).
- Respiratory infections occur as nosocomial infections in health service settings, mainly in individuals with immunosuppression and a marked hypoimmunity.
- Even nowadays influenza, tuberculosis, and streptococcal infections are global problems.

RESPIRATORY INFECTIONS OF BACTERIAL ETIOLOGY

Diseases induced by group A streptococci

Scarlet fever is essentially a streptococcal angina with exanthema which is caused by erythrogenic toxin produced by S.pyogenes. After the infection antitoxic antibodies are produced which survive in the long-term and prevent the manifestation of exanthema in the infection with another type of streptococcus.. In an individual with antitoxic immunity to erythrogenic toxin only angina occurs.
Secondary infections - they originate as complications of primary infections: sinusitis, lymphadenitis, otitis media, endocarditis, meningitis, sepsis, septic shock, etc.
Late (sterile) sequelae - due to the joint antigenic determinants of the streptococcus and the cells of myocardium, the heart valves and the basal membranes of the kidney glomeruli, antibodies impairing the tissues in a part of the sick are produced. Due to an immunopathological reaction after a streptococcal infection a **rheumatic fever with arrosion of the heart, joints or acute glomerulonephritis may develop.**

Diseases caused by Streptococcus agalactiae (group B)

It induces neonatal septic diseases, meningitis, pneumonia, otitis media, and late sepsis.
Streptococcus pneumoniae is one of the most serious causative agents inducing infection of the air passages: pneumonia, otitis media, sinusitis in adults, tonsillitis, and meningitis. Itis possible to isolate pneumococci from the nasopharynx in approximately 5 - 7 % of the healthy population. In pneumonia the ability of a prompt multiplication in alveoli with production of toxins applies. Pneumonia and meningitis usually affect adults and seniors over 50 years of age.
Meningococcal infections - the causative agent is Neisseria meningitidis. Gram-negative coccus, it causes bronchitis, tracheitis. A severe manifestation of meningococcal infection is **meningitis and meningococcemia** which are designated as **meningococcal invasive disease**. Vasculitis and thrombosis of the vessels, which result in development of the cereberal edema occur frequently.

Hemophilic infections

The causative agent: Haemophilus influenzae (H.haemolyticus, H.parainfluenzae). They induce infections of the upper air passages with local manifestations - hazardous are: epiglottitis, otitis, sinusitis, bronchitis, development of meningitis or pneumonia. Most commonly, sucklings and infants up to 5 years of age are affected. The clinical experience documents that viral infections of air passages facilitate the development of hemophilic complications. The most frequent incidence of the disease is during the winter months. The serotype change is very fast.
Invasive hemophilic infections manifest as meningitis and sepsis. They are induced by H.influenzae type B. Immunity is conditioned by the presence of bactericidal anticapsular antibodies which are obtained transplacentally after the experienced disease or after an active immunization. In the Czech Republic it is possible nowadays to use for immunization the hemophilic vaccines of various companies which have a varying vaccination regimen. Morbidity in children aged to 5 years ranges around 10/100,000 inhabitants.

Pertussis and parapertussis

The causative agent: Bordetella pertussis and B. parapertussis. It causes catarrhal inflammation up to necrosis of the mucous membranes, the respiratory tract, and mainly of the bronchi. The disease starts with an atypical catarrh of the upper air passages, a convulsive phase lasts for several weeks. With the introduction of immunization the incidence of pertussis is rare; **pertussoid syndrome is more common** (see a separate chapter).

Diphtheria

The causative agent: Corynebacterium diphtheriae. It induces acute and subacute pyrexial disease caused by a toxin. It manifests as an acute disease of the tonsillae, pharynx, larynx, nasal mucosa, genitalia or skin.

Characteristic is a **pseudomembranous inflammation of the mucous membranes.** After a nation-wide immunization diphtheria occurs nowadays only sporadically. Recently imported cases have been diagnosed.

Tuberculosis
The causative agent: Mycobacterium tuberculosis, M.bovis. It is one of the most widespread infections in the world. It is a chronic disease with affection of the pulmonary parenchyma which has in non-treated cases a tendency to transform to a chronic stage and disseminate into all tissues and organs. Nowadays the main threat is a n **increase in multiresistant strains of mycobacteria.** It is the main cause of death in HIV positive individuals; it has a faster course with a fatal end around 80 % of the time.

RESPIRATORY INFECTIONS OF VIRAL ETIOLOGY

Adenoviruses
They cause pyrexial diseases. After the incubation period of 5 - 8 days they manifest with pharyngoconjunctival fever, inflammation of the upper air passages, laryngitis, bronchitis, they may induce even pneumonia. They are caused by various types of adenoviruses (3, 7, 8, 9, 11).
Adenoviruses T8 and 19 are connected with development of epidemic ceratoconjunctivitis. After getting over the infection, the viruses persist in lymphoid tissues. Severe primary infections occur mainly **in children aged from 6 months till 7 years.** Adenovirus infections are common, they occur in the course of the year with a slight prevalence in winter and spring months. The infections in children are most frequently induced by the types 1 - 6, in adults by the types 4, 7, 11, 14.

Rhinoviruses
They are the most common causative agents of the common cold and inflammation of the upper air passages. The highest concentration of infectious particles is in mucous phlegm of the nasal mucous membrane. Sneezing and coughing results in a spread of infection by air and contaminated objects. The incubation period is usually 2 - 4 days. It is possible to register the rise of levels of specific (secretory) antibodies at the end of the second week of the disease (in recurrent infections around the seventh day). The infection occurs in children and adults. **Usually it doesn´t spread into the lower air passages. With the** common cold there doesn´t exist a specific treatment or prevention. The effect of local administration of interferon has not been authentically proved..

Influenza - Orthomyxoviridae, A, B, C virus (**see the separate chapter)**

Parainfluenza (Paramyxoviridae)
Types 1 - 4 induce infections in humans. The most frequent type 3 causes catarrh of the upper air passages from light forms up to severer, life-threatening pneumonia.It causes a pyrexial affection with rhinitis and pharyngitis, laryngotracheitis, and bronchitis. **Parainfluenza viruses participate in approximately 40 % of all acute respiratory infections in the pre-school age group .** The most serious forms of the disease exhibit in children up to two years of age.
The incubation period is usually short: 2 - 3 days. A much-feared complication in infants is pseudocroup - a mucosal swelling of the larynx. Immunity is short-term. The effect of anamnestic antibodies does not apply on the surface of mucous membranes. A specific and effective vaccine has not yet been at our disposal .

Respiratory syncytial virus
The RS virus belongs to the most important etiological agents of bronchitis and bronchiolitis in infants. Specific IgA antibodies apply in protection against reinfection. Passively transferred antibodies from mother to baby does not protect the suckling against the disease. A frequent complication is otitis media. Reinfections of elder children and adults manifest in most cases inapparently or as a light inflammation of the upper air passages.

Coxsackie viruses
All A and B types induce a short-term fever without other characteristic symptoms. Types A 10, 21, 24, and B 1-6 induce inflammations of the upper air passages and pneumonia. Types A 7, and 9, and B 1-6 cause aseptic meningitis and plurodynia.

Children´s exanthematous diseases: morbilli, rubella, varicella - see the separate chapters

Parotiditis - see the separate chapter

Chlamydia infections - ornithosis, psittacosis - **see the separate chapters**

EPIDEMIOLOGY OF STREPTOCOCCAL INFECTIONS

Streptococci form a large group of gram-positive microbes inducing one of the most frequent diseases of man. They were described by Billroth in erysipelas in 1874, and by Pasteur (1879) in the blood of a patient with puerperal sepsis.
Streptococci - gram-positive cocci that grow in chains. Nowadays we recognize more than 70 species which are possible to classify on the basis of a polysaccharide group antigens into 20 serological groups A - B. Streptococci without that group substance after incubation on blood agar are identified as viridans and non-hemolysing colonies. Their diagnostics are based on the basic biochemical properties (catalase, oxidase, glucose).
The most significant streptococci from the pathogenic point of view:

- **Streptococcus pyogenes** (group A)
- **Streptococcus agalactial** (group B)
- **Streptococcus pneumoniae** (pneumococcus)

In the past 10 - 15 years other streptococci have also been isolated to an increased extent in humans: enterococci group D and Q, streptococci of group G, and streptococci of group C. Other, so-called **viridans streptococci** have been diagnosed in connection with pathological lesions:S.bovis, S.mutans, S.constellatus, S.sanguis, SA.salivalius, S.intermedius, S.anginosus, etc.
Streptococcus pyogenes - determination of the protein antigens M, T, and R enables us to distinguish more than 80 serotypes. **M protein is a virulence factor.** It enables adhesion of bacteria on the mucosa surface and protects it against phagocytosis. Antibodies against the streptococcus M protein are protective, type-specific and protect against reinfection. M protein is also formed by ″L-forms″ of S.pyogenes. In some types a similarity of the antigenic structure to determinants of a basal membrane of glomerules was proved. They are designated as **nephritogenic (2, 6, 12, 49, 55, 57, 60).**
The types associated with rheumatic fever are designated as **rheumatogenic (1, 3, 5, 14, 18, 19, 24).**
Streptococci form a series of exogenous products applying in the pathogenesis of the infection.
Pyrogenic toxin - is associated with manifestations of toxic shock; it is **classed among the superantigens.** It can react directly with the beta- and gamma-part of the receptors on T-cells and thus avoid linkage on a specific bonding site of the receptors and simultaneously on a part of the MHC molecule (the main histocompatible antigen).
Streptolysin O - affects the cells of the heart muscle toxically, induces the production of antibodies.
Streptolysin S - on blood agar it produces a zone of complete hemolysis.
Hyaluronidase - it enables the spread of streptococci in the tissue.
Streptokinase A, B - applies as an activator of the fibrinolytic system.
DNAase - depolymerizes the DNA of leucocytes.

Diseases induced by Streptococcus pyogenes

Clinical features and diagnosis

The clinical picture of streptococcal infections manifests under varying forms. Clinical expressions depend on the age and the general status of the cellular and humoral immunity of the affected person. The diseases exhibit from inapparent up to serious, life-threatening affections with a fatal end.

Primary diseases

Angina and **scarlet fever** exhibit in the form of pharyngitis with tonsillitis. When the streptococcus produces erythrogenic toxin, it may be accompanied by exanthema - a clinical picture of scarlet fever (see the separate chapter).
Erysipelas - (see the separate chapter)
Pyoderma, impetigo - a surface, localized infection which originates in intoxications, malnutrition or in generalized infections. In children´s groups it may be the cause of epidemic prevalence.
Vulvovaginitis, puerperal sepsis, and **pneumonia,** they rarely occur in our country .
TSS - Toxic shock syndrome - develops during the production of pyrogenic toxin A or B.

Secondary diseases

They manifest as complications after primary and insufficiently treated streptococcal infections (dental abscesses, sinusitis,lymphadenitis, endocarditis, toxic shock states, etc.).

Late, the so-called sterile sequelae
They originate after a latent and manifest course of streptococcal infections or after an incorrect treatment of a primary disease.

- **Rheumatic fever**

It originates after a primary disease. It manifests by fever, arthritis, but the predominantly afflicted organ is the **heart.** It has a tendency to recurrences. **A rheumatic coronary disease with involvment of the valves** develops from rheumatic carditis after repeated attacks.

- **Acute glomerulonephritis**

It originates after an infection with nephritogenic types. There is usually no recurrence but it may transfer into a chronic phase.

Laboratory diagnosis
A classical culture on blood agar is a primary method. Determination of the antigenic characteristics of the serotypes is necessary for an effective antibiotic therapy and prevention of a secondary and late sequelae. **A commercial non-cultivation detection from throat swabs** is at our disposal nowadays for determination of the group A streptococci. A serological detection of the antibodies of **antistreptolysin O - ASLO** has a constant position in the disease diagnosis.
Surveillance of streptococci in the Czech Republic is carried out by the National Reference Laboratory for streptococci and that for enterococci at the State Health Institute in Prague.
Source - reservoir
A primary source is the sick or carrier. A nasopharyngeal carriage is frequent - seen in about 10 % of the population. It occurs mainly in children and young adults. A long-term culture influences the production of antibodies against the M protein and lipoteicholic acid.

Route of transmission
Air-borne - angina, scarlet fever
By ingestion of contaminated food - angina, an alimentary route of infection, frequent incidence in school and army settings.
Microaspiration of infectious secreta of the upper air passages - pneumonia
Introduction of a strain colonizing the skin at an injury - scarlet fever, infections of the soft tissues including erysipelas. A **nosocomial infection** may occur - vulvovaginitis, puerperal sepsis.
Indirect transmission - by contaminated objects, contamination of wounds and pyodermatoses.

Incubation period
Mostly short-term (1 - 3 days). In acute glomerulonephritis 10 - 21 days; in rheumatic fever 7 - 35 days.

Susceptibility
Susceptibility is general. Immunity against the M antigen is type-specific (including erythrogenic toxin). Affection by one type doesn´t protect against infection by other types. One must bear in mind that **production of the antibodies is markedly reduced** in early antibiotic therapy.

Infectious period
Weeks to months in case of a carrier state (and in untreated infections and pyodermia as well).
Infectivity quickly declines after antibiotic therapy - within 24 - 48 hours.

Incidence
Infections induced by group A streptococci belong to the most frequent bacterial diseases in the world - mainly affection of the air passages. **The highest incidence of streptococcal infections that exhibit in the Czech Republic are angina and pharyngitis diagnoses**. If we estimate that there are about 200,000 streptococcal anginas per year, risk of affection with rheumatic fever or acute glomerulonephritis is 1 : 1,000 to 1 : 10,000. Streptococcal diseases occur both sporadically and epidemically. **Streptococcal pharyngitis occurs most frequently in infants up to 3 years of age. The second peak is in the 6 - 12 age group.** They occur throughout the year, with a higher incidence in the winter months and at the beginning of spring.

Therapy principles

Therapy is based on penicillin. Streptococcus pyogenes resistance to penicillin has not yet been reported in the Czech Republic . In case of an allergy, erythromycin or other macrolides are administered. From the streptococcal diseases there is **obligatory notification only for angina and erysipelas** in the Czech Republic. Other streptococcal diseases are reported only in a mass prevalence.
Sepsis, meningitis and toxic shock syndrome have been reported in a routine system and followed in a surveillance programme since 1964. Late sterile sequelae induced by S.pyogenes group A have an independent system of notification.

- **In an epidemic prevalence of scarlet fever and angina -epidemiological investigation in the focus of the infection and sampling the biological material for culture examination.**

The cultural examination of contacts, elimination of the infective agent in the sick and in culture-positive persons. When there is a large number of ill children or persons of military groups, it is possible to administer a single dose of depot PNC (see the separate chapter). In angina and scarlet fever prevalence in school settings, medical surveillance is applied for a period of 8 days after the exclusion of the sick.

Diseases induced by Streptococcus agalactiae

Clinical features and diagnosis
Diseases occur mainly in newborns and in adults with hypoimmunity in the course of the basic chronic affection. In newborns they cause serious infections: **pneumonia, sepsis, meningitis and otitis media.**

- **Early acute sepsis** develops due to the ingestion or aspiration of infected cervicovaginal secreta of the mother at the delivery, most frequently within 48 hours.
- **Late sepsis** is characterized by meningitis which manifests between the 7^{th} day to the 3^{rd} month of life (a nosocomial infection among colonized newborns).

Diagnosis
Diagnosis is based on cultural detection of the infectious agent (nasopharynx, conjunctiva, umbilical stup, umbilical blood, mother´s stools, amniotic fluid, cervicovaginal secreta) and **determination of the type relevance - group B**. It is possible to use a **direct non-culture detection** from the cervicovaginal secreta of the mother and the cerebrospinal fluid, serum and urine of the newborn.

Source and reservoir
Colonized birth canals of mothers (7 - 20 %), a colonized newborn (20 % of newborns), upper air passages, conjunctiva cavity, meatus acusticus externus, umbilical stup, or possibly a colonized individual of the medical personnel.
Casual reservoirs - contaminated breast milk and cow´s milk. **Natural reservoir** - waste waters and water storage reservoirs.

Route of transmission
In the foetus - intrauterinely.
In newborns - at passage through the birth canals or from drinking breast milk.
In women - from sexual intercourse (3 % of men - incidence in the urethra).

Incubation period
1 - 7 days, infectious period: in carriers and untreated infections - weeks to months.

Susceptibility
The disease origin **in adults** is usually conditioned by a **marked reduction of immunity.**
The risk factors **in newborns: a low body mass at birth, a precocious placenta rupture** (more frequently in abortions). Immunity is type-specific. Antibodies are seen in 10 % of the women of fertile age. Streptococcus agalactiae exhibits in vitro a high susceptibility to penicillin, ampicillin, and erythromycin.

Preventive measures

- Examination of cervicovaginal secreta in women for the presence of the agent, or possibly a rectal swab during pregnancy and prior to delivery.
- To prevent infection in newborns during delivery - administration of antibiotics to women and disinfection of the birth canals during delivery, administration of antibiotics to the newborns at risk.
- Observance of the epidemic regimen in maternity departments.

Measures at occurrence

- Notification of the sick, sampling biological material for microbiological examination - determination of the etiological agent.

EPIDEMIOLOGY OF SCARLET FEVER AND STREPTOCOCCAL ANGINA

Scarlet fever

Clinical picture and diagnosis

A characteristic symptom of scarlet fever (scarlatina) is a dermal manifestation, i.e. exanthema which occurs when group A Streptococcus pyogenes produces pyrogenic, erythrogenic exotoxin. **In its essence it is a manifestation of angina and scarlatinal exanthema**.

It starts as streptococcal angina, eruption of exanthema develops during 24 hours. Exanthema is of a bright red colour, maculopapulous. It is present in the hypogastrium, groin, axilla, and the internal surface of the thighs. A characteristic sign of scarlet fever is absence of exanthema encircling the mouth and chin - **circumoral paleness (Filatov´s symptom)**. The tongue is coated with a deep red colour (″Raspberry tongue″). Desquamation follows after getting over the disease. On the skin around the nail beds there are small papules (Šrámek´s symptom). The clinical signs may include all symptoms connected with tonsillitis or infection of a wound, skin, etc. At present there is a zero mortality rate for scarlet fever in the Czech Republic. Among the most frequent early complications in scarlet fever are: otitis media, nasosinusitis, inflammation of lymphatic cervical nodes.

Angina

It is the most frequent manifestation of streptococcal infection. It has an abrupt onset with a high fever, chill and sore throat. Inflammatory alterations occur in the nasopharynx, and lymphoepithelial ring and regional lymph-nodes. In approximately 50 % of infected persons **the disease exhibits abortively**, with only a mild sore throat. In sucklings and toddlers a streptococcal disease manifests as nasopharyngitis or as a mucopurulent cold with a weak cough and lymph-node swelling. After 5 - 7 days it gradually burns out.

Complications may occur in angina and scarlet fever , especially after inappropriate treatment: **rheumatic fever and acute glomerulonephritis**, usually 1 - 4 weeks after the basic disease.

In a differential diagnosis it is necessary to differentiate other exanthematous diseases and allergic manifestations.

Agent

Streptococcus pyogenes - beta hemolytic streptococcus group A. According to the presence of polysaccharide antigens it is possible to distinguish more than 80 serotypes. Group C and G streptococci apply to a lesser extent as the causative agents.

Source - reservoir

The source of infection is the sick or carrier. In a healthy population a carrier state of Streptococcus pyogenes occurs approximately in 10 % . Streptococci exhibit a high resistance in the environment. They may survive in a dry state coated with droplets of exudate for a period of several months (dust particles, etc.).

Route of transmission

Transmission of streptococci occurs as **air-borne** and **through the alimentary route** as well, or **at injury**. Explosive angina epidemics occur after the ingestion of contaminated milk, milk products, scrambled eggs, etc. The nasopharynx and tonsils are in most cases the portal of entry. Streptococci can sporadically infect the surface of burns or other skin lesions, there then develops a picture of scarlet fever without phyryngeal and tonsillar symptoms (early scarlatina).

Susceptibility

Susceptibility is general. Scarlet fever mostly affects **children from 3 to 10 years of age; it doesn´t occur in sucklings**. Streptococci are quickly killed after an adequate treatment with penicillin. Consequently there is a lower production of erythrogenic toxin and stimulation of antibody production. Due to the heterogeneity of streptococci - **three types of erythrogenic toxin (A,B,C)** - scarlet fever may occur recurrently. After the experienced disease specific antitoxic antibodies with a long-term survival are produced, and they can prevent the origin of exanthema in further disease with a streptococcus producing the same toxin.

Incubation period

Usually 1 - 3 days.

Infectious period
There may be a varying infectious period, especially in asymptomatic carriers and in insufficiently treated or untreated angina and scarlet fever patients. In untreated cases streptococci can survive in pus and secreta for weeks to months (mostly 10 21 days).

Laborytory diagnosis
See the chapter ″Diseases induced by Streptococcus pyogenes″.

Incidence
A decreasing incidence has been systematically reported both globally and in the Czech Republic. There is obligatory notification of scarlet fever in the Czech Republic. A total of 5,664 cases were reported in 1998, with an incidence of 50.6 per 100,000 inhabitants.

Therapy principles
Penicillin is the primary drug in scarlet fever and angina. In persons with allergies to PNC macrolides are administered. In therapy with peroral penicillin the curative effect is not so prompt and reliable. The following therapy procedure is recommended for scarlet fever infection in military groups. The ill persons are hospitalized within 24 hours and admitted to the same room. Penicillin is administered in an adequate dosage within the first to third days of hospitalization. On the third day depot penicillin is administered simultaneously with pendepon i.m. - 600,000 u. Isolation lasts for 1 week, then a biochemical examination of the urine and sedimentation rate is carried out.

Preventive measures and measures at occurrence
For epidemiological measures, preventive and repressive, see the chapter ″Diseases induced by Streptococcus pyogenes″. **For the epidemic prevalence of angina in military groups** epidemetric indices are used - **attack rate, minimum manifestation,** which enable us to assess in time the resulting morbidity in case of an air-borne epidemic. It is possible to use this fact as an alternative to differentiated and early epidemic intervention.

- In garrison treatment rooms to assess the daily number of affections with a picture of angina and nasopharyngitis.
- In all sick and a defined number of healthy persons (15 % of the focus state) swabs from the throat are taken during fasting for bacteriological examination. The same applies also for ill persons who contracted scarlet fever before they were sent to the infection ward.
- **Morbidity estimate P** - a cumulative increment according to the formula: P % = (M.470)/(N.t)

M = cumulative number of diseases to the completed day t,
470 = a coefficient of proportionality,
N = troop strength (focus size), t = the day to which M is calculated.

- **The manifestation estimate** is carried out by assessment of the throat swabs of 15 % of the healthy samples.
- In situation I estimate P corresponds less than 3 % , in situations II and III estimate P corresponds in the range of 4 - 14 %, and in situation IV P corresponds higher than 15 %.
- It is possible to make an immediate decision in situations I and IV. In situation I only isolation, treatment, and active search for the sick are performed. A **mass prophylaxis in the focus** by a therapeutical dose of penicillin is carried out in all the sick in situation IV. In situations II and III the approach is differentiated, based on an assessment of the ratio of the **asymptomatic carriers** - a manifestation of less than 40 %. At a low manifestation (below 40 %) prophylaxis with penicillin is indicated. In an epidemic prevalence it is necessary to bear in mind that epidemics often originate on the basis of alimentary transmission which is characterized in an early stage by an **abrupt growth of incidence with an entirely evident focal character that is dependent on catering.**

EPIDEMIOLOGY OF ERYSIPELAS

Clinical features and diagnosis
Erysipelas (rose) is an acute streptococcal disease of the skin with general symptoms.
General symptoms may be alarming, accompanied by bacteremia. They start abruptly with chill, fever, and headache.

Local symptoms - dermatitis, including subcutis, is accompanied by burning, redness, itching and soreness of the regional nodes. Swelling is present with a tendency to spreading. The origin and development of vesicles in the site of affection is designated as **bullous erysipelas**. Gangrenous alterations sometimes occur in the affected site. It is most frequently localized on the lower extremities (calf - ulcer) or in the facial part of the head.
Females are affected more frequently than males. Recurrences occur after activation of the streptococci, especially in impairment of the local immunity of the skin and ligament. Streptococci reach the site of affection through primoinoculation or blood flow in angina or other streptococcal lesions. Acute glomerulonephritis can develop after 1 - 4 weeks after erysipelas.

Laboratory diagnostics
Determination of the etiological agent is important for a rational target therapy. See the chapter ″Diseases induced by Streptococcus pyogenes″. Detection of streptococci from the affected site is only 40 % even when using invasive procedures. In skin infections a rise in antistreptolysin O mostly doesn´t occur, deoxyribonuclease may be elevated.
Agent
Erysipelas is induced by group A beta-hemolytic streptococci , less often by group C (Streptococcus equisimilis), and G and B - Streptococcus agalactiae.

Source - reservoir
The primary source is the sick or carrier. In the healthy population of our country about 10 % are carriers of Streptococcus pyogenes (a higher figure in the 5 - 9 and 30 - 40 years age groups). The carrier state of other beta hemolytic streptococci is diagnosed in approximately 5 %.
The secondary source (reservoir) is in the close environs of the streptococcus carriers where streptococci in a dry state may survive for a period of up to several months.

Route of transmission
Both direct and indirect transmission. The agent penetrates the skin during minor trauma. The spread occurs from exogenous or endogenous sources. The exogenous sources apply mostly in functional skin lesions.

Susceptibility
It depends on the general health status of the patient and on the presence of protective type-specific antibodies against toxins and enzymes of the streptococcus. Diathesis of erysipelas rises in elderly people, especially in women.

Incubation period
Mostly 1 - 4 days.

Infectious period
It is impossible to determine exactly. Elimination of streptococci from the epithelial surfaces of the mucous membranes continues to be a serious problem.

Incidence
Notification of erysipelas is obligatory in the Czech Republic. There has been a yearly prevalence of about 3,000 cases and 5 - 10 deaths in recent years. In 1998 there was an incidence rate of 29.6 per 100,000 inhabitants a year. A rising trend of erysipelas has been reported all over the world, with a higher incidence in warm climatic zones. Sporadically, a nosocomial incidence of erysipelas after a surgery has been observed. The relatively frequent incidence of erysipelas in army troops is connected with microtraumata of the skin of the upper and lower extremities and poor observance of hygienic principles in heavy combat equipment crews (mechanized units and repair shops, etc.).

Therapy principles
A targeted administration of penicillin and a complex symptomatic therapy.

Preventive measures
- Prevention of erysipelas recurrences and secondary prevention of the disease sequelae (rheumatic fever and acute glomerulonephritis).
- Long-term dispensing of the sick and repeated treatment by penicillin.

Measures at occurrence

- Disease notification and sampling biological material to make an etiological diagnosis.

EPIDEMIOLOGY OF INVASIVE MENINGOCOCCAL INFECTIONS

Clinical features and diagnosis

An acute bacterial disease characterized by an abrupt onset with fever. Symptoms include intensive headache, joint ache, nausea, vomiting, photophobia, drowsiness up to impairment of consciousness of various degree, and reddish violet spots on the skin. These symptoms occur in various combinations of varying intensity.
Meningococcal invasive disease is a very serious and life-threatening disease. A prompt diagnosis and adequate treatment decide the patient´s fate. It can manifest through pharyngitis, bronchitis, tracheobronchitis, and pneumonia. It rarely manifests as a generalized pyrexial disease - **meningococcal septicemia or septic shock (Waterhouse-Friderichsen´s syndrome)**, sometimes with a peracute onset and severe course. At present the term **meningococcal invasive diseases** is used for the above mentioned clinical courses of infection in the world. In addition to the mentioned clinical courses meningococci also induce atypical diseases.

Diagnosis

Positive culture of N.meningitidis from liquor or hemoculture.
Direct detection of the antigens of causative agents in liquor or serum.
Clinical picture of meningococcal meningitis or sepsis.
Clinical picture of purulent meningitis - with unambiguous epidemiological data for N.meningitidis.

Agent

Neisseria meningitidis is the causative agent. According to the composition of the capsular polysaccharide it is possible to recognize these serological groups: **A, B, C, D, X, Y, Z, W135, 29E, H, I, K, L** (some strains spontaneously agglutinate or don´t agglutinate with any of the antimeningococcal sera). Groups A, B, C are involved in more than 80 % of the total number of invasive meningococcal diseases.

Source - reservoir

The sick or carrier are the source.

Route of transmission

Infection is air-borne, spreads by infectious droplets, at sneezing, coughing and kissing. The carriage of meningococci occurs in healthy individuals in the range of 10 - 30 % (military and children´s groups). Meningococci survive outside the human organism literally several seconds.

Susceptibility

Susceptibility to meningococcal infection is low and decreases with age. There is frequent asymptomatic carriage of meningococci. **Specific immunity** against meningococci is conditioned on the **presence of bactericidal antibodies**. Antibodies in the children´s population occur in low values and their level increases during life. The formation of antibodies is conferred even by non-pathogenic neisseria.

Incubation period

The incubation period is 1 - 10 days, most frequently 3 - 4 days.

Infectious period

Most of the invasive meningitides occur after contact with a healthy meningococcus carrier (Naso-oral cavity) or after contact with another invasive disease (minimal incidence). After starting the therapy, meningococci from the nasopharynx disappear within 24 hours.

Incidence

Invasive meningococcal diseases occur in The Czech Republic only sporadically, exceptionally also epidemically. The last epidemic was registered in the Czech Republic in the 1950s. In the years 1965 - 1992 the number of reported diseases in the Czech Republic fluctuated from 40 to 120 cases a year. The reported death rate is 0 - 12 persons yearly. The highest incidence was reported in the 4 and under age group .
Since 1993 a new epidemiological situation has come into existence in the Czech Republic. There occurred a new type of group C meningococcus which previously occurred only outside the Czech Republic (Denmark, Canada): There is a **new genetic clone of N.meningitidis C:2a, P1.2 (P 1.5), ET - 15/37. An increased**

sickness rate is usually limited to a certain locality or age group. The clinical course of the infection is more severe and often atypical - affection is increasing in the age group 15 - 19 years. In 1994 an increase in group C meningitides in the 1 - 4 years age group and in adults was registered. There appears to be an increasing number of diseases caused by group meningococcus **in children up to 2 years of age** where it is impossible to use a polysaccharide meningococcal vaccine.

Therapy principles
The basis for treatment of an invasive meningococcal disease is an early initiation of treatment, use of megadoses of penicillin, and support of the vital functions. Isolated strains of N.meningitidis are very well susceptible to penicillin in the Czech Republic.

Preventive measures
- A meningococcal polysaccharide vaccine A+C is licensed in the Czech Republic - the vaccination is administered **only when requested - not routinely.**

Vaccination of basic service soldiers with polysaccharide vaccine A+C started in 1993. According to WHO´s instructions, the vaccination is recommended when travelling to regions with an increased incidence of the invasive disease.

Measures at occurrence
- Obligatory notification of an invasive disease.
- Measures necessary to carry out in persons in contact with an invasive disease are quoted in ″**Methodic directions for epidemiological measures in the focus of an invasive meningococcal disease″:**
- An intensified medical surveillance for a period of one week, to limit physical exertion.
- To pay attention to persons in close contact with the sick (family, halls of residence, etc.) and to risk contacts: infants up to one year of age, adolescents, persons over 65 years (hypoimmunity). A protective chemotherapy is used in the ″risk contacts″: V-penicillin in therapeutical doses/week. The aim is to reduce the number of carriers and to prevent a secondary affection in the risk contacts.
- To limit the assemblage of people.
- In the epidemiological indication it is **recommended to carry out a targeted vaccination** (a first-rate monitoring in the given locality).
- Vaccination in the disease focus is not recommended. It is not possible to vaccinate the contacts before one week has passed (to provide an intensified surveillance, indication of a targeted protective chemotherapy).

EPIDEMIOLOGY OF LEGIONNAIRES DISEASE

Clinical features and diagnosis
An acute bacterial disease (legionellosis) which manifests in two different clinical forms: as **Legionnaires´ disease and as Pontiac fever**. The disease starts with headache, anorexia, and generalized exhaustion with an onset of fever from 39 - 40.5°C. **A nonproductive cough**, abdominal pains and diarrhea is typical.
In the Legionnaires´ disease radiograph a finding of lobar pneumonia with subsequent very slow clearing dominates. The mortality rate in hospitalized cases reaches up to 39 %. Pneumonia is absent in **Pontiac fever**, which has a benign course. Recovery occurs after a short time even without therapy. The clinical symptomatology is attributed to a reaction of the organism to the inhaled antigens of the legionellae.

Diagnosis is based on demonstration of the culture (detection by direct immunofluorescence in the tissue and aspirates) and demonstration of a rise in specific antibodies in the pair-sera.
Diagnosis in the Czech Republic is based on a **radiograph (x-ray) finding of pneumonia with a higher fever, negative blood and sputum culture,** and detection of involvement of the liver and kidney function.

Agent
Legionella pneumophila - Gram-negative rod. **The first demonstration was in 1976.** The infection occurred by infectious aerosol from cooling water of the hotel air conditioning system. In the course of the epidemic 34 exposed persons died.

L.pneumophila - 18 serotypes, type 1 dominates. Related species: L.micdadei, L.bozemanii, L.longbeachae, etc. These species have been isolated from pneumonias from immunosuppressed individuals. All legionellae **have a common antigen.** The phagocyted legionellae proliferate in monocytes.

Source - reservoir
The source in conception of the classical epidemiology has not been known. As reservoir there apply various water cooling systems, cooling towers, humidifiers, etc., from which legionellae were isolated.

Route of transmission
The epidemiological circumstances are in favour of the **inhalation transmission** of infection. An alimentary route of infection has not been unambiguously proved.

Susceptibility
It is general. The incidence increases with age. Most of cases have been observed in persons over 50 years of age, in persons with chronic pulmonary diseases, malignancy, immunosuppression after transplantation of the organs, and diabetes. The prevalence is 2.5-times higher in men than in women.

Incubation period
Legionnaires disease: 2 - 10 days . Pontiac fever: in most cases 24 - 48 hours.

Infectious period
Interhuman transmission has not been proved.

Incidence
It occurs both sporadically and epidemically, more frequently during the summer months and in the autumn. Most frequently there is detected an immunity rate against the L.pneumophilla serotype 1 (1 - 20 %) in the titres 1 : 128 and higher. The proportion of legionellae in the etiological structure of morbidity in pneumonia is in the range of 0.1 - 5 %. Ten cases of legionellosis were diagnosed in the Czech Republic in 1998.

Therapy principles
Erythromycin and macrolide antibiotics are recommended for therapy.

Preventive measures
- Periodical check of the air-conditioning units and distribution systems.
- Periodical microbiologic control of inhalation instrument sprayers.

Measures at occurrence
- Disease notification
- Epidemiological search for the source of infection in the environment and the route of transmission
- Effective decontamination of water reservoirs and their distribution systems by chlorination.

EPIDEMIOLOGY OF DIPHTHERIA

Clinical features and diagnosis
Diphtheria is an acute pyrexial disease of the tonsils and nasal mucosa; less frequently of the skin, conjunctions, middle ear, and genitals. The initial process is localized on the tonsils in the **form of a pseudomembranous inflammation** - greyish pseudo-membranes which after removing leave a bleeding base. A distinctive sweetish offensive odour in the mouth is refered to the disease. At present diphtheria exhibits as inflammation of the tonsils under a picture of **tonsilitis and pharyngitis, with enlargement of the cervical nodes**. Edema in the cervical region is present in more severe cases. Whitish pseudo-membranes may transfer on the uvula and soft palate. This finding in the patient should always direct the physician to a suspicion that it is diphtheria.
The disease depends on the immunity status of the individual and on toxicity of the C.diphtheriae strain.It may occur as a severe form - **malign diphtheria**. The most hazardous form is **laryngeal diphtheria - croup** which results even in anoxia and death.
In differential diagnostics of light forms it is necessary to differentiate streptococcal pharyngitis, tonsillitis, bacterial and viral pharyngitis, infectious mononucleosis, candidiasis, but also manifestations of oral localization of syphilis.

Nasal diphtheria - it manifested once in sucklings and toddlers as a pseudomembranous and catarrhal form under a picture of rhinitis with suppurative secretion and maceration.
Cutaneous diphtheria - it is a lighter form resembling impetigo. In typical lesions greyish membranes occur.
Late sequelae caused by a diphtheric toxin - involvement of the peripheral and cephalic nerves, myocardium, and kidneys (after 2 - 6 weeks). The mortality rate used to be over 50 % in the past. After applying antitoxic animal globulins in the therapy it decreased to approximately 5 - 10 %. The current therapy with antibiotics has shortened the time of treatment and convalescent carriage, but has not reduced morbidity markedly.
At present diphtheria occurs in unsuccessfully immunized adolescents with hypoimmunity. The etiological diagnosis is made on the basis of microbiologic examination. Throat cultures are taken with a detoxicated cotton swab from the tonsils or other involved sites, namely prior to therapy by antibiotics. A standard culture examination is carried out. Microscopy has only an orientation value. In case of positive cultures it is necessary to carry out **toxinogenicity determination of the strain.**

Agent
Corynebacterium diphtheriae, a gram-negative club-shaped rod. According to the growth properties we distinguish the designated gravis, intermedius, and mitis cultural types.
Clinical symptoms are caused by the toxin of C.diphtheriae (genetic information for production of the toxin). Individual strains don´t differ substantially in toxicity. They are resistant in the environment. They can survive in the phlegm and secretion even several weeks

Source - reservoir
The sick already at the end of the incubation period or the carrier in convalescence or a healthy carrier of a toxic strain of C.diphtheriae. A convalescent carriage may persist several weeks. The carriers of toxigenic strains are treated with antibiotics - erythromycin, etc. In some cases the clinical picture of diphtheria in our conditions is so indistinct that it is difficult to assess whether it concerns carriage or affection.

Route of transmission
By a direct contact with the sick or carrier - **by droplet infection**.
Indirectly - by contaminated necessities.

Incubation period
Usually 2 - 5 days, maximum 7 - 8.

Susceptibility, immunity
Susceptibility is general. The vertical transmission from the mother protects the infant in the first 4 - 6 months. In the course of life a decline of specific antibodies gradually occurs. Protective immunity is reached by obligatory mass vaccination. Already the first two Di-Te-Pe doses of the basic vaccination provide a sufficient but only short-term immunity. **The schedule used in the Czech Republic in healthy children confers sufficient production of protective antibodies**. Persons born after the year 1958 have in a high percentage (82 - 97 %) a protective level of antibodies. Immunity depends on the level of IgG of antitoxic antibodies in the blood. The levels of IgG antibodies persist after basic immunization in most vaccinees for 5 or more years. Studies in the USA demonstrated that more than 40 % of the population have lower titres of protective antibodies. The same applies to Canada and to some European countries.

Infectious period
From the end of the incubation period throughout the whole time of affection (about 14 days) but rarely longer than a month. An effective therapy quickly eliminates survival of the agent.

Incidence
Vaccination against diphtheria was introduced in our country in 1946, then a gradual decrease followed, and the downward trend ended up in the late 1970s. Since that time **it has occured sporadically**. In recent years only imported cases have been reported. A high incidence of diphtheria is still reported from the Russian Federation, Ukraine, the Balkans (1994 - 39,000 diphtheria cases, 1, 100 deaths). Mostly children up to 15 years of age have been affected. Either now or in the future it is not possible to exclude incidence of sporadic diseases in some ethnic and social groups (contacts with immigrants). **A high level of group immunity prevents spread of diphtheria in the Czech Republic.**
Even nowadays it is not possible to neglect **surveillance of diphtheria** - a careful monitoring of serologic surveys and determination of toxigenicity of the isolated strains of C.diphtheriae is necessary. Diphtheria occurs primarily in non-immunized children up to 15 years of age.

Therapy principles
Early administration of hyperimmune globulin simultaneously with antibiotics.

Preventive measures
Immunization against diphtheria is the basis for prevention.
Basic immunization: infants from the 9th week of life are vaccinated by the trivaccine Di-Te-Pe (diphtheria and tetanus toxoids and pertussis bacterin) in three doses at 1-month intervals. The vaccine is administered i.m. in the amount of 0.5 ml, applicable best in the upper external gluteal region or anterolateral region of the thigh. **Subcutaneous administration reduces efficacy** and may be accompanied by a local adverse reaction. The fourth dose is administered at 18 - 20 months of age, the booster dose at 5 years of age prior to entering elementary school. The vaccination schedule provides a high level of antitoxic antibodies. Revaccination is carried out by a booster dose after 10 years during vaccination against tetanus.
It is possible to immunize **adults with a single booster dose of vaccine, adult type (Te-Di) prior to travelling** to countries with a higher incidence - a WHO recommendation. The adult type vaccine contains a lower dose of reduced anatoxin (2 - 4 Lf of diphtheric anatoxin, together with 40 IU of tetanus anatoxin).
Vaccination is carried out in persons who recovered from diphtheria because the amount of antibodies produced after diphtheria recovery doesn´t correspond to a protective level (0.01 IU/ml). Nowadays both **cellular** and **acellular** forms of of Di-Te-Pe vaccines are used for immunization. Simultaneously it is possible to carry out a vaccination against HBV. The fourth dose together with the vaccine against measles, mumps, and rubella should be administered always into a different site.

- Please, bear in mind that in immunization of children over seven years of age, the adult type vaccine (Te-Di) is administered.

Measures to be taken

- Obligatory notification of suspect cases of diphtheria and isolation in the infection ward.
- In the epidemiological search in the focus , sampling of the biological material is performed for microbiologic examination (swabs from the tonsils and nose), including contacts. In the case of a carrier - in a healthy individual isolation at home is directed, and treatment by penicillin, at allergy by erythromycin, follows.
- **In the focus of the infection** - intensified medical surveillance for a period of seven days after the exclusion of the last sick.
- Penicillin is prophylactically administered for 5 days to susceptible, non-vaccinated children, and to adults who were in contact with the sick.
- After recovery from diphtheria it is possible to admit the child into a community establishment after two negative cultural examinations from the throat and nose.
- After completing isolation a continued immunization is performed in non-vaccinated or incorrectly vaccinated children, or possibly in adults.
- In case of detection of C.diphtheriae toxigenic strain carriage, the above mentioned measures including isolation are carried out.

EPIDEMIOLOGY OF PERTUSSIS AND PARAPERTUSSIS

Clinical features and diagnosis
It concerns a respiratory disease which progresses in three stages. The onset starts with an atypical dry cough and catarrhal symptoms.

- **Catarrhal stage** - symptoms persist 10 or more days
- **Paroxysmal stage** - whooping cough intensifies. A cough at night in short episodes with a series of short expirations and subsequent crowing , choking inspiration. Phlegm, mucus expectoration, and vomiting often follow (duration 1 - 2 months and longer) a coughing episode. In children under 6 months of age, adolescents and adults this stage manifests often atypically. In this stage some complications arise, including bronchopneumonia, pneumonia, other, which used to be the most frequent cause of death.
- **Convalescent stage** - the cough slowly diminishes in this stage. It lasts several weeks, the child sleeps better and puts on weight. Prior to ATB therapy the mortality rate in children under 6 months of age reached 50 - 80 %.

Nowadays, the infection manifests atypically with a long-term whooping cough, possibly even with vomiting which should lead to a suspicion of **whooping cough syndrome**.

Parapertussis - the disease has a lower manifestation and is considered a mild one. It differs from pertussis in typical cases by: a short period in the catarrhal stage (1 - 3 days), a shorter paroxysmal stage (1 - 2 weeks) and the total duration of the disease (3 - 4 weeks). Complications start in the first days of the disease (3 - 5 %).

- Whooping cough syndrome (pertussoid syndrome) - in addition to the below mentioned agents it is induced by other agents: **Haemophilus influenzae, atypical mycobacteria, mycoplasma pneumoniae, adenoviruses, influenza viruses, parainfluenza viruses, etc.**

Diagnosis of pertussis is based on **symptomatology** and **microbiological examination** (swabs from the larynx and pharynx). Due to B.pertussis susceptibility it is necessary to consult a planned examination with the laboratory (a prompt seeding or freezing on solid carbon dioxide). There is indirect **detection of the specific antibodies**. Blood is taken on day 0 and day 21. It is always necessary to mention the date of the Di-Te-Pe (DTP) vaccination.

Agent
Bordetella pertussis - Gram-negative coccobacillus susceptible to solar radiation, drying and disinfectants. It is designated according to the surface antigens in 4 types:Type 1, 2, Type 1, Type 1,3 ,and Type 1, 2, 3. It produces toxins from which **endotoxin affects the mucosa of the respiratory tract** and capillary system.
Bordetella parapertussis - it differs serologically from B.pertussis and has no cross-immunity with it. There is a possibility to induce clinical symptomatology by both types.

Source - reservoir
Man only, already 3 - 4 days prior to the onset and in all stages of the disease.

Route of transmission
Air-borne, by close contact with the sick.Transmission by contaminated objects is less common.

Susceptibility
It is general in non-vaccinated children. The child is protected after birth by the antibodies of the mother; they quickly disappear within 4 - 8 weeks. Immunity after an experienced illness is life-long.
The immunization confers sufficient immunity to most pre-school and school children (80 % protection already after 3 doses). In older adolescent the antibody titre gradually decreases to the limit values. In the epidemiological search in the focus, illness in the adult contacts is also demonstrated.

Incubation period
6 - 20 days, most frequently 7 - 10 days.

Infectious period
At the end of the incubation period and within the whole period of paroxysmal cough; often also in convalescence (positive culture). The clinical diagnosis only assesses whooping cough syndrome.

Incidence
The Czech Republic started immunization by the triple vaccine Di-Te-Pe in 1958 - the first country in the world . A long-term surveillance together with a high mass vaccination status resulted in a marked decrease in incidence already by the end of the 1970s. **Eradication of pertussis has not been successful.** The immunization schedule was changed in 1993. No pertussis case was diagnosed in children under 3 years of age. Pertussis and parapertussis sporadically occur in school children and adults. **Imported cases have increased recently.** There is a relatively high incidence of pertussis in neighbouring countries - Germany, Austria, Poland, Switzerland, etc. It is necessary to consider this in the diagnostic process and to search in case histories for trips abroad. Nowadays the incidence rate of pertussis and parapertussis in the Czech Republic reaches 0.1 - 0.3/100,000 inhabitants/year. Pertussis and parapertussis remain a great problem in developing countries.

Therapy principles
Antibiotic treatment with chloramphenicol and erythromycin shortens the infectious period but doesn´t reduce markedly the disease manifestations.

Preventive measures
Obligatory immunization by a triple vaccine against diphtheria, tetanus, and pertussis.
A mixed vaccine of 40 Lf diphtheric anatoxin and 30 units of tetanus anatoxin in 1 ml, absorbed on a mineral carrier together with a killed bacterial suspension of at least 3 strains of B.pertussis (serotypes 1, 2, and 3).

Infants are immunized from 9 weeks of age. **The basic immunization - 4 doses.** Three doses at 1-month intervals, the 4th dose at 18 - 20 months of life. The vaccine is administered i.m. in a dose of 0.5 ml into the anterolateral region of the thigh or into the upper part of the gluteal region using a dry-needle method. Between the 1st and 2nd vaccine dose it is necessary to observe the interval of 6 weeks as a maximum. **When the interval is longer, it is necessary to restart the vaccination. The booster injection is in the fifth year of life.**
Duration of a protective immunity for diphtheria and tetanus: more than 10 years, in whooping cough about 5 years.
Contraindication to vaccination: all febrile diseases, active TBC, malign diseases, corticosteroid therapy, congenital and degenerative diseases of the CNS, severe allergic reactions, etc.
Adverse reactions: a local erythema and infiltrate. General reaction: subfebrile states, allergic reactions with swelling at the site of injection and circulation failures are rare.
Vaccination with a whole-cell vaccine is not recommended in children over 7 years of age and in adults. Nowadays, acellular vaccines in combination with Di-Te (DT) anatoxin are prepared. The immunization may be combined with the OPV vaccine against poliomyelitis, H.influenzae type b (Hib), HBV vaccine, and vaccine against measles, parotitis, and rubella administered in different sites.

Measures to be taken

- Disease notification, early diagnosis, isolation of the sick at home, hospitalization in complicated cases only.
- **Epidemiological search**: Search for reservoirs and contacts, their microbiological examination. **Isolation at home (21 days)**, a ban on visits to children´s group, medical surveillance of close contacts (thermometry). In case of a respiratory illness manifestation : consult the physician. In the indicated cases it is possible to carry out a 14-day prophylaxis by erythromycin.

Quarantine for non-vaccinated children who were in family contact with the sick for a period of 21 days (ban on school attendance). A continuous disinfection of toys, boiling the underclothes, handkerchiefs, towels. A clean-up with application of disinfectants.

EPIDEMIOLOGY OF INFLUENZA

Clinical features and diagnosis

The clinical course is analogous to a respiratory infection. After a short incubation period (2 - 3 days) fever, headache, muscle ache of extremities, swelling of the nasal mucosa, and laryngotracheitis with a dry cough appear. An uncomplicated illness usually lasts 3 - 7 days.
The virus multiplication in the airways induces development of an inflammatory infiltrate, edema and destruction of mucous membranes. In this stage obstruction of the airways may occur, together with a varying atelectasis in the middle or lower lobe of the lungs. At an extensive involvement of the lungs - **primary influenzal pneumonia** - sudden death may occur with symptoms of severe intoxication.
A secondary bacterial infection may occur in some of the cases, the course of the disease is prolonged. Rey´s syndrome and otitis, sinusitis, pneumonia occur in children and adolescents.
Pneumococci, staphylococci, and H.influenzae apply in the etiological structure of pneumonia of a bacterial origin. Influenza threatens the lives of individuals with weakened immunity, infants, people over 65 years of age, pregnant women, and people with chronic diseases with a cardiopulmonary insufficiency. A less frequent complication is affection of the CNS, heart muscle, pericarditis, and pancreatis.

Diagnosis
To establish the clinical diagnosis in epidemic patterns is relatively easy, but it is nearly impossible in sporadic incidence without laboratory examination.
Laboratory diagnostics: The optimum time for collection of material for examination is within the first four days after the disease onset. Nowadays it is possible to isolate the virus from the nasopharyngeal swabs (washing), inoculation of the material into the amniotic sac of embryonated eggs or a tissue culture after 6 - 24 hours. Isolation of viruses enables further identification of the influenzal strain and antigenic changes of H and N antigens. For a rapid diagnosis we carry out detection of viral antigens in cells from impressions of nasal mucosa, swabs or washings of the nasopharynx using the immunofluorescence method or ELISA test in secretions.
Diagnosis is based on a **marked increase of the specific antibody levels** in the pair sera. Identification is performed using haemagglutination inhibition test (HI test) or CFR (soluble NP-nucleoprotein) - type specificity. A rapid type detection and identification is useful for early epidemic measures. Specific antibodies are usually not detected in the acute stage. Determination of specific IgM is useful for a complex diagnosis.

Agent

Influenza viruses belong to the Orthomyxoviridae family. They may be pleomorphic, spherical or filamentous ,virions are 80 - 120 nm in diameter. The viral RNA resides in the capsid. It consists of 8 segments of a single fibre connected with RNA- transcriptase.

Nucleocapsid proteins (NP) and membrane proteins (M_1, M_2) are species specific and relatively stable. They are common to all subtypes and variants of the given genus. On their basis it is possible to classify viruses into types A, B, C. The virion envelope is studded with glycoprotein spikes - antigen **haemagglutinin (H) and neuraminidase (N)** specific for individual virus species. There are three H antigens and two N antigens known in humans. Both antigens are variable and condition the differentiation of antigenic subtypes and variants.

- In the type A subtype A (H1N1) and A (H3N2) both envelope antigens are liable to significant changes. In type B it is only the H antigen. A drift often occurs in the course of the epidemic.
- Influenza viruses designate to two genera - viruses type A and B - two species of the genus Influenzae. Influenza virus type C (RNA has only 7 segments) belongs to a separate genus. Its surface antigens are relatively stable. Influenza viruses replicate in the cell nucleus (nucleocapsid development). They obtain the envelope by gemmation on a cytoplasmic membrane of the infected cells. NP induces a specific cell-mediated immune response and is a target for cytotoxic lymphocytes with the membrane of infected cells. Influenza viruses resist well to room temperature in dry secreta and droplet mucus.

Influenza virus variability

In addition to man, e.g., wild birds, horses and some sea mammals are the natural hosts of virus A. All type A influenza viruses have similar internal antigens - NP and M and they only differ in surface glycoproteins.

- Haemagglutinin H - to date 14 haemagglutinin types of the virus A are known, designated by the serial numbers H1 - H14. And various types of neuraminidase N1 - N9. The complete types of H and N antigens occur in nature only in various influenza viruses of birds (mutual affinity).
- In human influenza A types there is a **continuously registered variation of the surface antigens which circulate in the population**. An abrupt change in haemagglutinin and neuraminidase is called **antigenic shift**. A new subtype occurs abruptly, its spread is usually of a pandemic character and is connected with a high mortality rate in humans. The reasons for type A antigenic shifts are not known in detail. It is supposed that there occurs a combination of animal and human influenza A viruses. Inter-species transmission has been observed in nature. **Man is susceptible to the influenza virus of pigs.** It is supposed that some influenza A types of birds may adapt to pigs and then to man. But even a possibility of multiple mutations should be considered.
- **Point mutations** and subsequent changes in the amino acid sequence occur in the influenza virus, namely in the epitope where the antibody is bound. This process results in the selection of mutants and minor continuous antigenic changes in the prevailing influenza A type (**antigenic drift)**. Also the type B virus undergoes similar changes. Drift changes of the influenza virus continuously progress and enable reinfection of persons who recovered from infection by the same type.

Source - reservoir

Man at the end of the incubation period and in the first days of an acute disease (primary reservoir of human influenza). The animal reservoirs are: pigs, birds and ducks, who may, after genetic changes, be reservoirs for new human subtypes (genetic reassortment). **The new subtypes are virulent strains with new surface antigens** - they induce an influenza pandemic.

Route of transmission

By close contact with the sick, airborne. Most frequently in crowded, closed rooms where a high concentration of the infectious aerosol occurs due to sneezing, coughing and nose-blowing. Indirectly - by objects contaminated with the secreta of the sick.

Incubation period

A short one, several hours, 1 - 3 days.

Infectious period

A high infectivity from the onset of the disease (1^{st} - 5^{th} day), in infants from the 7^{th} day.

Susceptibility

General, **the highest in children and young adults without specific antibodies**. Immunity is long-term after recovery from the disease; it is **strictly type- and strain-specific** - antibodies don´t protect against the disease by a new virus variant.
Specific antibodies against haemagglutinin inhibit the bond of virions to a susceptible surface of the cell. They prevent haemagglutination and have a neutralizing effect. Their presence in secreta of the airways prevents reinfection. Immunity mediated by T-cells plays an important role in protection against influenza. Cytotoxic lymphocytes have an irreplaceable role in elimination of infection.
The influenza virus markedly affects functional activity of the macrophages and mucosal surfaces of the airways (reduced chemotaxis, depression of cell cooperation). This results in a weakened self-defence ability and an increased susceptibility to associated bacterial infection.

Incidence
Pandemics with prevalence of the new influenza A virus subtype are the most serious. The new subtype gradually replaces all the types circulating in the population and becomes dominant. Mankind has probably suffered from influenza since time immemorial. Over the past hundred years pandemics occurred in 1889, 1918, 1957, and 1968. The so-called **Spanish influenza** is well documented. It occurred in 1918 - 1919 and more than 20 million people died. It was confirmed that it had concerned the type A of pigs, the subtype H1N1. This type with small changes circulated until 1956. In 1957 a new influenza A virus subtype H2N2 occurred which induced a pandemic of the Asian influenza and killed several millions of people. Another antigenic shift was registered in 1968 when a pandemic was induced by the subtype H3N2 with a lower incidence and morbidity rate. The influenza A virus subtype H1N1 reappeared again in 1977 (drift-unchanged since 1956) and quickly spread all over the world together with the subtype H3N2. Since that time epidemics with a prevalence of one subtype of the A virus or influenza B in sporadic incidence of both A subtypes have occurred. Influenza in the Czech Republic usually occurs from **January to April**. Type A induces smaller epidemics; type B causes a local incidence with a gradual spread. The course of the epidemic depends on the population immunity rate and on the antigenic type of the influenza virus. The first strain of influenza A virus H3N2 identically related to that of A/Sydney/5/97 was identified in the Czech Republic in November 1998. Type B was detected both serologically and by direct reaction. In the National Reference Laboratory for Influenza the RS virus was detected from the 50^{th} week of 1998, together with Mycoplasma pneumoniae, parainfluenza virus, and adenoviruses (Most, Teplice, Ústí nad Labem). It is necessary to evaluate the information about local epidemics of influenza on the basis of an objective demonstration because most acute respiratory diseases manifest similarly.
In 1998 the influenza vaccine had all the preconditions for an effective protection because up to that time isolated strains corresponded antigenically to the strains included in the vaccine. In the National Reference Laboratory for Influenza in Prague strain H3N2 from a 12-year old girl was isolated in the third calendar week. The army laboratories in Plzeň and České Budějovice registered local epidemics in Bohemia and Moravia.

Therapy principles
Confinement to bed, symptomatic treatment from the onset of the first symptoms, antipyretics, and analgetics.
Chemoprophylaxis - amantadine is a specific preparation which can be used against the influenza A virus. It protects against infection when administered preventively. After the onset of symptoms it alleviates the clinical course and reduces the excretion of the virus. The primary dose is 200 mg/day , then the dose is lowered to 100 mg/day for a period of 4 days. Administration in some people induces mental disorders (insomnia, shivering, lack of concentration, etc.).
Rimantadine - has no side-effects with the same effect; it is possible to administer it both preventively and therapeutically. When bacterial complications occur, targeted antibiotics are administered - ampicillin, aphalosporin of the third generation, etc.

Preventive measures
They result from the world surveillance programme for influenza and viral acute respiratory diseases (ARD):
- Notification of ARD, **weekly monitoring**, to follow up the circulation of influenza viruses and ARD.
- Serological surveys - antibodies against influenza viruses and ARD.
- Prognosis for the coming season.
- Plan of organizational measures: aims and scope of the immunization campaign.
- **Immunization against influenza is the basis of prevention.**

For a vaccine to be effective it must contain the surface antigens of the circulating influenza viruses - the topical drift variants. It usually contains antigens of the A type (subtype H3N1, H1N1) and the B type. The influenza vaccines used:
- **Whole virus formalized vaccine** - it induces side-reactions caused by the lipid layer of virions.

- **Subunit vaccine** - contains separated surface antigens H and N; it is less reactogenic but also less immunogenic (AGRIPAL S1, INFLUVAC).
- **Split vaccines** - contain split virions, the virus disrupted (well detectable by electron microscopy), they are less reactive, confer a good protective immunity (FLUARIX, BEGRIVAC, SUBINVIRA, VAXIGRIP).
- **Live attenuated vaccine** - contains genetically stable thermosensitive mutants. The virus multiplies in the upper respiratory tract, it doesn´t spread into the lower airways, confers well immunity and production of secretion antibodies.
- **Peroral vaccines** - designed on the basis of a subunit or split antigenic fraction, and conjugated on a suitable protein carrier, e.g., cholera toxin B. The vaccine is capable of inducing a mucosal antibody response.

The strains used for immunization in 1997 - 1998: A/WUHAN 359/95 H3N2, A/BAYERN 7/95 H1N1, B/BEIJING 184/93.
The strains for the season 1998 - 1999: A/SYDNEY/5/97 H3N2, A/BEIJING/262/95 H1N1, B/BEIJING/184/93

Vaccination principles
Vaccination must be carried out every year always in a pre-epidemic period. In the Czech Republic **the most suitable time** for vaccination is considered the period **from the middle of September till the middle of December**, according to the epidemiological situation. The administration of a single dose is effective if the individual already has an immunological response after experiencing a natural infection or after vaccination. In children younger than 9 years who have never been vaccinated against influenza and haven´t experienced influenzal illness, it is necessary to administer two doses in the interval of 0 - 1 month. In case of a new subtype incidence when influenza pandemic threatens, two doses are administered in all persons regardless of age and previous immunization.The vaccination schedule:

- Age 3 - 35 months - a split or subunit vaccine is administered i.m. in the amount of 0.25 ml into the anterolateral region of the thigh (in the following year into the deltoid region).
- Age 3 - 8 years - a split or subunit vaccine is administered i.m. in the amount of 0.5 ml in a single dose.
- Age 9 - 12 years - a split or subunit vaccine is administered i.m. in the amount of 0.5 ml into the deltoid muscle.
- Over 12 years - a split, subunit or a whole virus vaccine is administered i.m. in the amount of 0.5 ml into the deltoid muscle.

Indication
The vaccine is intended for immunization of all persons, mostly after 6 months of age, who are at a higher risk of complication from influenza disease.

a) Persons with a higher risk of complications

- Chronic cardiopulmonary diseases
- Chronic respiratory, urological, and haematological diseases
- Persons with HIV, diabetes
- Immunosuppressive therapy
- Persons requiring frequent hospitalization for chronic illness
- Persons aged 6 - 18 years, treated long-term by acetylsalicylic preparations due to a possibility of Rey´s syndrome risk
- Persons over 65 years of age

b) Persons who may be the source of influenza for patients at risk

- Medical and non-medical personnel of hospitals, nurseries, and kindergartens
- Persons whose family dependents belong to the risk group

Contraindication
Women in the first trimester of pregnancy, if it is not urgent. At a guess, about 30 % of risk group persons undergo influenza vaccination in our country.

Reactions to vaccination
Local: soreness and redness, in split and subunit vaccines about 5 - 10 %

General:

- Febrile reactions, fever over 38°C, minimal reaction in split and subunit vaccines, duration of 6 - 12 hours in 1 - 2 %.
- An immediate allergic type reaction (e.g., allergic asthma, general anaphylaxis) occurs rarely.

Simultaneous administration of other vaccines
Immunization against influenza may be combined, e.g., with vaccination against Haemophilus influenzae type B, measles, mumps, rubella, diphtheria, and poliomyelitis.

Vaccination efficacy
- Most vaccinated children and adolescents exhibit high antibody titres after vaccination.
- Vaccine efficacy in persons with weakened immunity varies with age, immunological competence and a degree of affinity of the vaccine virus with the virus applying in the epidemic.
- In case the vaccination virus coincides with the virus which at the given time spreads in the population, protectivity of the vaccinees reaches about 70 - 90 %.
- A protective effect exhibits after 14 days. The protective period is mostly short-term, usually 1 year, after 2 years it is minimal. Therefore, **revaccination is performed each year**.
- Antibodies against haemagglutinin and neuraminidase type IgG occur in the blood after vaccination. A protective effect is ensured by a sufficient number of secretion antibodies occurring on the surface of the respiratory tract cells. Antibodies against haemagglutinin neutralize the virus, protect against absorption of the virus on the receptor sites of the target cells.

Measures at occurrence
- Notification of the disease at occurrence, early isolation at home and therapy.
- Possible chemoprophylaxis in persons over 65 years of age.

EPIDEMIOLOGY OF ADENOVIROSES

Clinical features and diagnosis
A viral illness of the upper part of the respiratory tract is characterized by conjunctivitis, rhinitis, cough, nasopharyngitis, pharyngoconjunctival fever. Fever is usually higher in infants than in adults. A severe course of infection is induced by adenoviruses in infants from 6 months to 6 years of age. Complications induced by bacteria are often associated with adenovirus infection.
In a differential diagnosis it is necessary **to distinguish Parainfluenza virus 1, 2, 3, RSV, Rhinoviruses, Coxsackie viruses A, B, and ECHO viruses** which have similar clinical symptomatologies. RS viruses and parainfluenza viruses in children within the first two years of age cause tracheitis, bronchiolitis, acute pneumonia, and croup, and they significantly participate in acute respiratory disease morbidity.

Clinical symptoms of adenovirus infections:

ARD - epidemic incidence	Type 4, 7
ARD - endemic infections	3, 11, 14, 21
Pharyngoconjunctival fever	3
Keratoconjunctivitis	8, 19
Pneumonia of sucklings	7
Gastroenteritis in children	40, 41
Conjunctivitis	3, 7, 2, 5, 6, 9, 11

Type 37 is sexually transmitted, it induces urethritis and cervicitis. Adenoviruses have common epidemiological features and clinical course with other causative agents of the airway inflammation. They are associated with various morbidity in children, in adults with inability to work. Etiological diagnosis of adenoviroses is based on **detection of specific antibodies and isolation of the causative agent.** The agglutination test of latex particles with bound antibodies (NT - neutralization test, HIT - haemagglutination inhibition test) serves for detection.

Agent
DNA - genus of adenoviruses (the Adenoviridae family), nonenveloped viruses of 70 - 90 nm. The capsid has cubic symmetry - 252 capsomers (pentons and hexons). Viable virions survive at room temperature in the environment. Adenoviruses - assigned to 41 serotypes, the subgenuses A and E include onogenic adenoviruses. **Adenoviruses are used in genetic engineering** as vectors of genes which incorporate into the cell chromosome (DNA region transport into the cell nucleus)

Source - reservoir
The source is the sick and asymptomatic carriers of adenoviruses (tonsils, adenoid vegetation).

Route of transmission
By a direct droplet route. Indirectly by contact with exudates of the affected mucous membranes (eyes, tonsils, nasopharynx). Family incidence has often been reported. Water-borne infection has been reported in bathing with insufficiently chlorinated water. Alimentary and sexually transmitted (type 37) infection is also possible.

Incubation period
1 - 10 days, most frequently 5 - 8 days.

Susceptibility
It is general, occurs in all age groups. Adenoviruses multiply in epithelial cells of the conjunctivae, nasopharynx, and intestines. Infection penetrates the tonsils and lymphatic nodes. In a marked weakening of the organism, the infection surpasses the lymphatic barrier and viremia occurs.
Secretion IgA apply in self-defence. The presence of anamnestic antibodies prevents the spread of infection into the lower respiratory tract. Antibodies persist shortly - **reinfections are common**. At penetration and proliferation of the virus in the lymphatic nodes there may be a long-term persistence without symptoms of the disease.
In individuals weakened by a long-term chronic disease they induce pericarditis, meningoencephalitis, and pneumonia.

Infectious period
At the end of the incubation period and 14 days from the onset of the disease symptoms. Infectivity persists for several weeks in infections induced by the RS virus.

Incidence
Global, common. They manifest sporadically and epidemically in the course of a whole year (mainly in the winter and spring). Most frequently types 1 - 6 induce illness in children, types 7, 11, 14, 21, and others induce respiratory adenoviroses in adults. Epidemics are often registered in children´s and army groups.
Incidence is high in infants, 2 - 6 episodes yearly per child. It depends on the virulence of the infectious agent and on the number of susceptible children. Epidemic incidence is most frequently observed in adenoviruses 4 - 7.

Therapy principles
A specific chemotherapy is unknown. It is possible to use ribavirin in children with a generalized infection after transplantation.

Preventive measures
- Health education, general hygienic habits (when coughing and sneezing).
- To limit the assembly of people during the epidemic period.
- Peroral adenovirus vaccine against types 4 and 7 has been used abroad (military groups).
- The genetic stability of attenuated vaccination strains which excrete after vaccination, has not been unambiguously confirmed.

Measures at occurrence
- Notification at an epidemic incidence, isolation of the sick at home, a ban on school attendance, continuous disinfection.
- An epidemic regimen in medical establishments and sanitary measures.

EPIDEMIOLOGY OF TUBERCULOSIS, VALID IMMUNIZATION

Clinical features and diagnosis
Tuberculosis is a general chronic infectious disease mainly affecting the respiratory tract. In approximately 10 % of cases it has extrapulmonary localization. The disease manifestations can be classed as **primary** and **postprimary**.
- **Primary TB infection** is characterized by **development of a primary complex** formed by a specific inflammation at the point of entry of BK (Koch´s bacillus), peribronchial lymphangiitis and a specific inflammation of a regional lymphnode. A prevalent part of the primary complexes is **localized in the lungs**. An extrapulmonary primary complex usually develops due to a deglutition BK infection. Primary TB

infection manifests through nonspecific symptoms and clears spontaneously.Calcification of the residual foci occurs during the further course of TB. Mycobacteria may persist there up to several decades and cause **endogenic reactivation of TB**. Only in about 10 % of infected individuals does the so-called postprimary TB develop in the course of life. **The primary infection confers cellular immunity**, its manifestation is a late-type tuberculin hypersensitivity (PPD).

- **Postprimary TB** - all forms of tuberculosis which develop in primarily infected persons, i.e. in humans who had a positive tuberculin reaction prior to the disease. The spread of BK occurs by **preformated airways**, aspiration of the metastases, and sputum expectoration (larynx TB). The spread may occur by a **lymphatic route** when the agent surpasses the lymphatic barrier and reaches the blood. Dissemination into other organs occurs (e.g., bones, cerebral matter, joints, kidneys).

The symptomatology of tuberculosis is varied depending on the scope of affection. In about 1/3 of cases the disease is long-term asymptomatic.

Suspect symptomatology of the respiratory tract TB

- A cough lasting longer than 3 weeks and accompanied by expectoration of mucopurulent sputum.
- Hemoptoe - pinkish foaming sputum.
- A long-term fever persisting longer than 4 weeks, especially in the evening, associated with sweating during sleeping.
- Localized chest pain associated with pleural irritation.
- A pronounced fatigue even at a low load, breathlessness and weight loss.

In patients with extrapulomonary TB it corresponds to the symptomatology of the respective organ impairment.

Diagnosis

An epidemiological case history in the family and its environs. An assessment of the risk factors - diabetes, alcoholism, immunodeficient states, refugees, emigrants, drug addiction.

Rentgenography examination - informs about the scope and intensity of the process, assessment of topographic relations, etc.

Tuberculin test - it is carried out to detect late type hypersensitivity. Two TU units of purified tuberculin (PPD) are administered intracutaneously, the result is read after 24 and 48 hours. A positive reaction is characterized by infiltrate and erythema at the site of infection. In vaccinated persons it is usually less than 10 mm in diameter. A larger diameter of the infiltrate and erythema gives evidence for a postinfection state (illness possibly exists). **A negative reaction documents that the individual hasn´t experienced TB.** Specialized examinations are carried out to make the diagnosis more accurate (bronchoscopy, bioptic invasive examination, etc.).

Laboratory detection of the causative agent: M.tuberculosis, M.bovis, M-bovis BCG - laboratory demonstration is decisive.

- **Sputum examination** - sampled most frequently into a sterile vessel 3 x in succession. When there is no expectoration, saliva specimens of 5 to 10 ml are collected or a laryngeal swab is used.
- **Urine examination** - collection of early-morning urine of 20 ml (the first micturition) 3 x in succession.

Other material is sampled if need be : pus, punctates of the lymphnodes, excised tissue, liquor, etc.

Microscopical detection of BK acidoresistant rods in the sputum preparation or detection by the fluorescence method with auramine-rhodamine staining. It is necessary to examine 100 viewing fields to confirm a negative finding. The results are assessed quantitatively.

BK cultivation - a more sensitive detection method than microscopy of the sputum. It enables a further investigation of the isolated strain, e.g., species specification and susceptibility testing of antituberculonics.

Molecular - genetic approach - identification of the mycobacterial complex. The procedure is based on amplification of DNA - sequence of the mycobacteria genome. It is possible to read the result within 1 day , which results in acceleration of the diagnosis.

Agent

Mycobacterium tuberculosis and **M. bovis** are the causative agents of classical tuberculosis in man. The M.bovis Calmette - Guérin bacillus (BCG) - it is an attenuated nonvirulent strain used for vaccination and immunomodulation treatment. It is necessary to emphasize that in a low percentage it may induce a local postvaccination complication, possibly even generalization of the TB-process.

- **Antigens:** tuberculin, CORD factor
- **Opportunistic pathogenic mycobacteria:** M.avium, M.intracellulare, M.kansasii, M.xenopi, M.fortuitum, M.chelonnae, etc.

An increasing BK resistance up to multiresistance to antituberculotics may occur in incorrect procedures during TB-therapy. Resistance to a single antituberculotic is frequent, it ranges from 10 to 60 %.

Source - reservoir
The source is the sick with TB of the respiratory tract, with positive sputum microscopy (1 ml/10^7 BK). One unknown TB reservoir may infect in its surroundings about 10 individuals (in a family, school, or military group).

- **The source - man with a positive BK culture** but with a negative sputum microscopy **infects in his environs about 6 % of exposed persons**.

Route of transmission
Tuberculosis spreads by a **droplet route** from the sick with TB of the respiratory tract and larynx. In the past, the second most common route of TB spread was a **deglutition infection** by infected milk. In those cases the primary complex was localized in the digestive tract. **Inoculation of the causative agent** by a contaminated object may rarely occur in the skin traumatism. It results in a chronic abscess with swelling of the regional nodes. **Superinfection -** it is a transmission of BK from a new source to a person already previously infected.

Susceptibility
Susceptibility to BK is general. It depends on the degree of exposure . The highest susceptibility is in early childhood (under 4 years of age), puberty and in pregnant women . A higher risk of TB development exists in immunodeficient states, silicosis, diabetes, alcoholics, malign diseases, and in the sick with immunosuppressive treatment and HIV who have a higher mortality rate. Reactivation of a long-term latent TB occurs during prolonged undernourishment and drug addiction.

Incubation period
Skin hypersensitivity to tuberculin of a late type occurs 3 - 12 weeks after contact with the source of the infection (evidence of an experienced inapparent infection or after a BCG vaccination). A manifest TB occurs in about 10 % of those naturally infected, namely within two years from the infection in most cases.
A latent persistence of BK may last decades up to an entire lifetime.

Infectious period
Epidemicity of the reservoir depends on:

- Infectiosity of BK, i.e. on the number of expectorant BK pathogens, their virulence and the possibility of generating a secondary aerosol - during coughing, breathing, and singing.
- The most dangerous are **the sick with BK positive TB of the lungs and larynx**. Administration of antituberculotics quickly reduces BK infectivity within just several weeks.

Incidence
Pandemic. Tuberculosis is recognized all over the world. Approximately 1/3 of the world´s population is infected with M.tuberculosis. About 8 million new cases are reported annually by the WHO, 7.6 million in developing countries and 400,000 in industrial countries.

- Since 1992 the tuberculosis epidemics have been induced by multiresistant BK strains. A high risk is in HIV positive persons - **a threat of transmission to medical personnel**.
- About 100 persons die of tuberculosis a year in the Czech Republic. In 1990 - 1995 2,000 new cases of all TB. forms and localizations were registered. Tuberculosis of the respiratory tract is reported in more than 1,100 cases yearly - the incidence rate is 11 per 100,000 inhabitants.

Mycobacterioses, non-tuberculous mycobacterial infections occur in the Czech Republic in the Ostrava region.Infection develops from an environmental reservoir when infected water is the transmission factor. **There is no interhuman transmission.**

Therapy principles

- **A combination of antituberculotics is the basis for an effective treatment**: isoniazid (INH), rifampicin (RFP), pyrazinamide (PZA), ethambutol (EMB), streptomycin (STM), etc. Administration of the recommended combinations results in a prompt debacillisation of the sick within just 3 - 6 months and in resistance inhibition. An effective therapeutic regimen is a short-term directly controlled therapy in which a **4-drug combination - INH, RFP, PZA, EMB - is administered in the initial stage for two months** followed by a four-month stage of a 2-drug combination with pyridoxine. The total time of treatment is 6 months in BK positive, and 4 months in BK negative.
- A long-term therapy regimen lasts 12 months. Antituberculotics are administered in the initial phase in a 4-combination. Then transfer to a 3-combination and 2-combination follows in the daily regimen. **A direct control of drug ingestion by medical personnel is the basic prerequisite of the regimen**, and individual susceptibility testing of antituberculotics.
- No reliable therapeutical regimen exists for treatment of multiresistant tuberculosis.

Primary resistance - finding of a resistant BK strain in an untreated patient.
Acquired resistance - develops due to an irrational treatment.

Therapy principles

- Directly controlled chemotherapy.
- Therapy failure – the **cause of resistance development:** an incorrect choice of antituberculotic combination, an insufficient control of drug ingestion, poor cooperation and indiscipline of the sick.. According to the WHO the correct TB therapy together with vaccination are considered the most effective ways of the programme in the struggle against tuberculosis.

Preventive measures

Obligatory immunization with BCG vaccine is the method of tuberculosis prevention in the programme of the Czech Republic.

Vaccine: BCG vaccine (B. Calmette-Guérin), the Copenhagen 1331 strain, containing live bacteria (100,000 - 300,000 germs), BCG SS1 - BCG vaccine lyophilizate.

- Nowadays in the Czech Republic all newborns from the 4th day of life with a birth weight higher than 2,500 g are vaccinated to 6 weeks without the necessity of carrying out the tuberculin test (if they weren´t exposed to the risk infection). After this age immunization against tuberculosis is carried out in each person who had a negative response in the tuberculin test. It follows from the law that **immunization is controlled by the tuberculin test 3 months after the last dose administration**. When the child was not vaccinated and the tuberculin test is negative, he/she is vaccinated at two years of age. In the central Bohemia and East-Bohemia regions since 1966, and in the South-Bohemia region since 1989 only newborns of risk families or at the parents´ request have bee vaccinated. Since 1994 immunization against tuberculosis has been adjusted by Decree No. 19/1994 of the Statute Book, which extended the obligatory vaccination to the above mentioned regions as well.

Dose administration to newborns i.d. into the left shoulder - 0.05 ml, to children from 11 years of age - 0.1 ml. **In children with a negative tuberculin test** and unproved scar, the booster injections are administered at two and eleven years of age.

Immunization by BCG vaccine generates the artificial primary complex. After 2 - 4 weeks at the site of the injection a nodular granuloma forms which clears after 6 - 8 weeks. A successful vaccination generates **a late type hypersensitivity to tuberculin**. The vaccination doesn´t induce a complete protection against the disease (efficacy about 40 - 80 %) **but increases immunity against tuberculous infection**. It prevents severe lymphohematogenous forms of tuberculosis: basilar meningitis, miliary dissemination and lymphatic tuberculosis. The immunity status is detected i.d. by the tuberculin test (**Mantoux test**).

Contraindication: febrile diseases, laboratory verified immunodeficiency, corticoid therapy, treatment by irradiation and antimetabolites, generalized eczema, HIV positivity, and a positive tuberculin test. After recovery from pertussis, the vaccination is performed at a negative tuberculin test no sooner than 6 weeks after this.

Complications after vaccination (1 - 10 %): ulceration and abscess in the site of injection (10 mm and larger in size). In newborns enlargement of the lymphatic nodes, production of subcutaneous granuloma, cheolid scars, and , sporadically, a generalization of tuberculosis occurs.

- **After the primary immunization it is possible to administer other vaccines only after 12 weeks and after revaccination after 8 weeks -** always after the injection site heals. Immunization of medically stigmatized children is carried out at their hospitalization.

Passive search for unknown TB sources method

It concerns the search for symptomatic forms of the disease, their isolation, treatment, and follow-up.

- The epidemiological search in the focus of infection is aimed at the risk groups of patients (silicosis, HIV, AIDS, diabetes, immigrants, etc.).
- The mass x-ray survey method is not performed in the normal population due to cost-effectiveness reasons.

Measures at occurrence

- Notification of the sick, isolation and treatment.
- Search in the infection focus - **search for sources and risk contacts.**

Examination of contacts is carried out using the tuberculin test, induration over 10 mm is assessed. In the vaccinees it witnesses a postinfection hypersensitivity rather than a postvaccination response. Chest radiography, follow-up, and repeated examination after 3 - 6 months are performed. In HIV positive persons and children in contact with open tuberculosis it is possible to use chemoprophylaxis for a period of 6 - 12 months.

EPIDEMIOLOGY OF ORNITHOSIS AND PSITTACOSIS

Clinical features and diagnosis

An acute generalized chlamydial disease with distinctly expressed clinical symptomatology. The clinical picture is characterized by fever, headache, exanthema, muscle ache, and involvement of the upper respiratory tract. The physical finding may be mild even in an extensive roentgenography finding of bronchopneumonia or an atypical pneumonia. During coughing **mucopurulent sputum,** pleural ache, and hepatosplenomegaly occur. The disease mostly has a chronic, milder course. Myocarditis, and thrombophlebitis occur as complications. Relapsing occurs in untreated patients.
A working diagnosis can be made on the basis of the epidemiological history, clinical signs. A serological examination confirms the diagnosis:

- **Rising antibody titres** in the paired sera - in the interval of 3 weeks, or a direct detection - isolation of the Chlamydia psittaci from the sputum or blood.
- In differential diagnostics it is necessary to differentiate **a chlamydial infection caused by Chlamydia pneumoniae - strain TWAR** which causes acute respiratory diseases with cough, hoarseness, and fever symptoms, and infiltrate in the middle and lower pulmonary lobes. The diagnosis is supported by detection of specific IgM and IgG antibodies and isolation of the agent. Man is probably the source; antibodies have not been detected in animals. The incubation period is longer than 10 days. The infectious period is unclear. Susceptibility is general and immunity imperfect.

Agent

Chlamydia psittaci (family Chlamydiaceae), resembles gram-negative bacilli; it is an intracellular energy parasite, and has no autogenous system for ATP production. At the end of the growth cycle the parasitized cell is full of elementary bodies (inclusions - 10,000/cell). The chlamydiae possess a genus - specific lipopolysaccharide antigen which applies in KFR (Ch.psittaci, Ch.trachomatis, Ch.pneumoniae - TWAR strain, Ch.pecorum).A species-specific antigen is of diagnostic significance.

Source - reservoir

Various species of parrots (hence the title parrot disease - psittacosis, avia - chlamydiosis), poultry, pigeons, sea-gulls, canary- birds, sea birds, etc. Birds, apparently healthy, apply both as carriers and the reservoir of infection, especially in case of increased stress: straitened circumstances in cages, long-term transport, abrupt temperature changes, starvation, etc. Ch.psittaci strains have been isolated from more than 100 species of birds in which they induce ornithosis. The strains in mammals cause pneumonia in piglets, calves, sheep, goats, and cats.

Route of transmission

Air-borne: inhalation of dust particles containing droppings, feathers fragments or an aerosol of the airways secreta of birds. The infection may be transmitted to breeding farms for poultry, ducks, turkeys, and may induce illness in breeders. Laboratory infections have also been reported.

Incubation period

1- 4 weeks, most frequently about 10 days.

Susceptibility

General. Immunity after recovery is partial and short-term. The elderly are more susceptible to infection. There are no objective proofs that persons with positive antibodies are protected against infection.

Infectious period

Birds excrete long-term Ch.psittaci in the course of the disease and in convalescence. Asymptomatic carriage may be constant and intermittent, lasting for several weeks or even months.

Incidence

Global. It mostly affects individuals in close contact with the ill or apparently healthy birds or poultry in breeding farms. The infection may occur in our country **in small bird (parrot) fanciers** or at farms and poultry farms, in salespeople dealing with birds, or in zoo personnel. It occurs in the form of sporadic cases; a higher number of non-diagnosed cases of psittacosis is anticipated. The incidence rate in the Czech Republic was higher in 1965 - 1968 when 45 - 195 cases were reported yearly. Most of them originated from poultry and duck

abbatoirs. Complex epidemic measures in those workplaces resulted in a significant reduction of incidence. Incidence has kept within ten cases in the last ten years.

Therapy principles
A specific therapy using tetracycline preparations. In case of tetracycline contraindication (pregnancy, infants) we administer erythromycin.

Preventive measures:
- Health education - risk of infection.
- Surveillance of the import, breeding and sale of parrots.
- Continuous reduction of pigeons in towns and veterinary surveillance of poultry farms.

Measures at occurrence
- Notification, isolation at home, disinfection of objects, careful sanitation.
- **Quarantine measures** in the affected farms. The infected birds are treated or destroyed. It is necessary to disinfect the breeding areas safely.
- **Search for the reservoir in the infection focus**
- It is necessary to disinfect the destroyed suspect birds in a disinfection solution (2 % phenol, 2 % chlorine preparations) and to transport them in a frozen state to the veterinary laboratory.

EPIDEMIOLOGY OF CHILDREN´S EXANTHEMATOUS DISEASES

Common features of children´s exanthematous diseases include an acute febrile course, the presence of a differently expressed catarrhal stage connected with headache, rhinitis, conjunctivitis, nasopharyngitis, and swelling of the lymphnodes. In a close link-up to the catarrhal phase, usually at a drop in temperature , eruption of the exanthema occurs which in individual nosologic units has a specific character, appearance, dynamics of eruption and fading with transition to convalescence.

Exanthema in measles and rubella
Prior to the eruption of exanthema in measles and rubella, **the catarrhal stage is more manifested**, at the end of which eruption occurs. The exanthema **in measles** is maculopapulous of an intermediate size with a tendency to coalescence (**facies morbilosa**). It starts on the head and gradually spreads down to the neck, abdomen, and limbs (usually 3 and more days), the rash then fades. **Rubella** usually has a milder course, exanthema is maculopapulous , efflorescences are usually smaller than in measles, they mostly don´t coalesce. It appears first on the face and neck, it is not so marked on the limbs. Usually a swelling of the retroauricular and cervical lymph glands accompanies rubella. In measles and rubella we may encounter complications - **bacterial superinfection of the upper respiratory tract.**

Varicella - an exanthematous disease of children with a catarrhal stage. **Eruption** of the exanthema occurs **in several waves**. Maculous, papulous, vesicular morpheae and drying up crusts occur simultaneously. Eruption starts on the limbs, the hairy part of the head, then on the trunk, but it is absent on the palms and soles.
Herpes zoster - eruption of morpdaea occurs **along the dermatoma**. Accompanied by paresthesia and soreness. Eruption of the tiny vesicles is very dense. Eruption in **herpes simplex** is usually localized in the lips, both in primary and recurrent infection. Herpes viruses survive long-term in the organism and manifest at hypoimmunity or on various endogenous stimuli (elevated temperature, menses, immunosuppression, etc.).

Diagnosis of exanthematous diseases is supported by the epidemiological case history and the clinical picture. As the clinical picture is often unclear, detection is confirmed by a serological demonstration of type-specific antibodies in acute- and convalescent-phase sera - detection of IgM and IgG specific antibodies in ELISA assay. Diagnosis is confirmed by a direct isolation of the virus from conjunctivae, nasopharynx, dermal morphae or urine, saliva, or possibly liquor.
In a differential diagnosis of exanthematous children´s diseases it is necessary to differentiate exanthemas of another etiology, e.g., of scarlet fever, induced by Streptococcus pyogenes group A, corynebacteria, some enteroviruses, disseminated herpes simplex, impetigo, etc.
Agents inducing exanthema in the course of disease manifestation
- Causative agents of children´s classical exanthematous infections, RNA and DNA viruses
- Enteroviruses, e.g. E 71
- Coxsackie viruses - type A 5, 7, 9, 10, 16

- ECHO viruses inducing meningitis with maculopapulous exanthema (Boston´s disease)
- Adenoviruses (1, 2, 5, 6, 9), etc.

Epidemiological features
The common feature of exanthematous diseases is mainly a droplet-borne spread or by contact with nasopharynx secreta.

a) **Epidemic prevalence** - in measles and rubella before starting the vaccination
b) Periodic and seasonal prevalence - mainly in the winter months and at the beginning of spring, related to a change of herd immunity, sometimes they manifest in cycles (formerly parotiditis, measles, rubella, etc.).
c) Prevalence in childhood - is given by the high susceptibility of children which enables easy droplet-borne transmission.

Source and reservoir
The sick (carrier) mostly at the end of the incubation period and in the first week of the disease at a manifest and latent course. Infection of pregnant women with rubella results in transplacental transmission of the infection to the fetus and sequential malformations.

Susceptibility
It is general in children´s infections. A lifetime immunity is conferred after recovery. For rubella about 10 % of young adults of non-vaccinated cohorts remain susceptible. Transplacentary transmitted antibodies protect the newborn for a period of several months.

Incubation period
It ranges from 7 to 23 days. It includes the time for colonization of the viruses in the nasopharynx and their multiplication in the mononuclear cells of the lymphatic system. Then viremia and subsequently eruption of the exanthema occur.

Infectious period
It varies. Usually a week before the prodromal stage and a week after appearance of the exanthema. **Measles have the highest index of infectivity** - nearly 100 %, rubella and mumps about 50 %.

Incidence of exanthematous diseases in the Czech Republic significantly decreased after the adoption of regular vaccination. Elimination of parotiditis and measles was nearly reached (in 1998 - 10 cases of measles). In recent years morbidity in rubella was about 6,000 cases a year, and in varicella about 50,000 cases. Introduction of vaccination against varicella in the Czech Republic is envisaged for the future.

Prevention
Specific prophylaxis by immunization in measles, rubella, and mumps (TRIVIVAC, MMR, etc.) is of fundamental importance in prevention of children´s exanthematous diseases.
Epidemiological surveillance plays an important role in prevention of exanthematous children´s diseases on the national and international level. It comprises:

- A comprehensive collection of data: incidence, course of the disease, vaccination, clinical trials of respective vaccines, seroprevalence according to age groups, etc.
- A complex data analysis.
- To provide the obtained results to the general public and laymen.

EPIDEMIOLOGY OF MEASLES - VALID VACCINATION

Clinical features and diagnosis
They manifest as an acute, viral, highly infective febrile infection with a prodromal catarrhal phase.
The catarrhal phase period, associated with fever, conjunctivitis, rhinitis, cough, and a marked photophobia. Appearance of a ″cry-baby″, **facies morbilosa** - edematous eye-lids, evanescent exanthema, rhinitis.
Koplick´s spots - occur on the mucosa of the oral cavity around the molars a day before the exanthema eruption.
The exanthematous period phase: Manifestation of finely macular exanthema occurs at a drop in fever (4^{th} - 5^{th} day) due to viremia. The exanthema has a tendency to coalescence, it is deep red, sometimes violet. Its eruption starts behind the ears, then on the neck, face, and finally on the trunk. The total eruption lasts about 3 days, then there is gradual retrogression in the same order as it was manifested.

The most severe course of measles is in children up to three years of age and in adults. Complications are caused by viremia or bacterial superinfection. Otitis media, laryngotracheitis, and bronchopneumonia occur. Subacute sclerosing panencephalitis occurs at a rate of 1/100,000 measle cases in the first two years of life. **Diagnosis** is based on the epidemiological history and the clinical picture knowledge. Diagnosis is confirmed by detection of specific IgM antibodies or an increase of IgG in the paired sera (ELISA). Isolation of the virus from the blood, conjunction sac, nasopharynx or urine is successful up to the third day of the exanthema eruption.

Agent
The measles RNA virus is a member of the Paramyxoviridae family. It is **highly contagious** to man (a single antigenic type). Inclusions are produced in cytoplasma and in the nuclei of infected cells. Surface antigens H and F have haemagglutination activity.

Source - reservoir
The sick man in the catarrhal stage and in the exanthematous phase.

Route of transmission
By droplet infection, a close contact with mucosal secreta of the nasopharynx of infected persons. Less frequently, indirectly by freshly contaminated necessities.

Susceptibility
General. Infection results in lifetime immunity. Measles have a high, nearly 100 % manifestation. The transplacentar antibodies of mothers protect newborns for 6 - 9 months and even longer. A shorter persistence of the antibodies after vaccination of mothers is generally admitted.

Incubation period
Average - 10 days (a range of 7 - 18 days) from exposure to the fever manifestation. Administration of immunoglobulin prolongs the incubation period to 21 - 25 days.
Infectious period
Shortly before onset of the catarrhal phase, when there is the highest proliferation of the virus in the nasopharyngeal mucosa. It lasts 4 - 5 days after manifestation of the exanthema. **The vaccination virus doesn´t exhibit infectiosity.**

Incidence
More than 50,000 cases were reported yearly in the Czech Republic prior to the introduction of the vaccination in 1969. In 15 % of cases the disease was accompanied by complications and the fatality rate reached 0.1 to 0.2 %. 89,702 cases were reported in the Czech Republic in 1966, and only 2,748 cases in 1978.
After introduction of a regular vaccination there occurred **a rise in herd immunity** and a significant decreasing trend in the incidence of measles. Nine cases were reported in 1994, 19 cases of measles in 1998. Measles still remains a serious health problem in developing countries. According to the WHO data about 1 million children die yearly. Introduction of mass vaccination is the way of improvement.

Therapy principles
Therapy is symptomatic in non-complicated cases. Antibiotics are administered in bacterial complications. Corticoids are administered when measles encephalitis occurs.

Preventive measures
Vaccination by a live attenuated vaccine is the basis of prevention.
A combined vaccine containing attenuated viruses of measles, parotitis and rubella (TRIVIVAC, SEVAC) has been used for vaccination in the Czech Republic since 1994. The vaccine contains the Schwarz measles strain , an attenuated Jeryl Lynn strain of the mumps virus, and an attenuated RA 27/3 strain of the rubella virus. It is possible to vaccinate measles with a monovaccine (MOVIVAC) in combination with parotitis (MOPAVAC) or with a trivalent vaccine. The combination of three attenuated viruses meets the required seroconversion after administration of individual viruses. The presence of basic antibodies is no contraindication to vaccination (there is no risk of side effects).

Basic immunization: The vaccine is administered at 15 months of age in the amount of 0.7 ml subcutaneously. After the first dose the measles component induces production of antibodies in 95 - 99 % of susceptible children. After the second dose it is seen in 100 %.
Recall injections are administered immediately after reconstitution within 8 hours (thermolability). The injection is administered s.c. in the anterolateral region of the thigh or into the deltoid muscle by the dry-needle method.
A protective effect develops 3 - 4 weeks after the vaccination. A lifetime immunity is expected. The MMR and TRIVIVAC vaccines induce only local reactions at the site of injection. A general reaction occurs 6 - 8 days after the vaccination, associated with fever over 38°C, exanthema, and swelling of the regional nodes. The exanthema is evanescent, of a small extent. Postvaccination encephalitis occurs rarely (1 case per 1 million immunization doses), convulsions sporadically. Reactions are similar after revaccination at 11 - 12 years of age. Their frequency is many times lower. Symptoms of joint affection manifest exceptionally in vaccination with the TRIVIVAC vaccine.
Contraindication - the vaccine is not administered to pregnant women. Women who received the TRIVIVAC vaccine mustn´t become pregnant within the following 3 months - a risk of foetus infection. The vaccine is not administered to children with an acute chronic disease, to the HIV sick, and to persons treated by immunosuppressive agents. In case of immunoglobulin administration it is necessary to postpone vaccination for 3 months. It is possible to vaccinate with the TRIVIVAC parallel to other vaccines.

Measures at occurrence

- Disease notification.
- Serological verification of the diagnosis. Examination of the paired sera of the sick (an interval of 2 - 4 weeks).
- Epidemiological search in the infection focus:

    - In non-complicated cases isolation at home for 7 days from the exanthema eruption.
    - Intensified medical surveillance in children´s and pre-school establishments for a period of 18 days from the exclusion of the ill children.
    - Insusceptible children (have already experienced measles) may attend the establishments.
    - Susceptible children from families with the disease incidence may again attend the establishment 18 days after the last contact with the sick.
    - **Immunization of contacts:** Immunization within 72 hours from exposure may provide protection to susceptible persons.
    - **Norga** - a normal human immunoglobulin, is administered within 6 days after exposure to contacts who have a high risk of complications - small children not yet vaccinated , persons with sustained contraindications, pregnant women, persons with a chronic degenerative illness.

Immunoglobulin is administered in a dose of 0.2 ml per 1 kg of body mass. In immunosuppressed persons it is 0.5 ml/kg.

EPIDEMIOLOGY OF RUBELLA - VALID VACCINATION

Clinical features and diagnosis
Rubella mostly proceeds as a mild febrile disease with exanthema. The associated syndromes: elevated temperature, headache, irritation of the conjunctivae, rhinitis, and cough. The catarrhal stage of rubella is usually shorter and less pronounced than in measles.
Exanthema is difussively maculopapular, usually it doesn´t coalesce. It appears first on the face, then transfers to the neck and trunk, is non-pronounced on the limbs. Simultaneously with exanthema **in small children** there are markedly enlarged **retroarticular and cervical lymphnodes.** Enlargement of the lymphnodes sometimes preceeds eruption of the exanthema. The disease may proceed without exanthema or only shortly with an evanescent one (a duration of several hours). Exanthema results from an immunopathologic reaction of the organism to immunocomplexes in the cutaneous capillaries.
Prodromal symptoms **in adults** last for about 2 - 3 days. Sore throat, fatigue, fever, and conjunctivitis are present. After exanthema the temperature quickly drops to normal values. Rubella in adults proceeds inapparently in up to 50 % of cases. Arthritis is a common complication, especially in women. Hazardous is **postinfection encephalitis** with an incidence rate of about 1 case per 5,000 affections.

Rubella is dangerous to pregnant women. Infection in the first trimester of pregnancy may result in a generalized and persistent infection of the foetus, the so-called **congenital rubella syndrome**. The incidence rate of congenital defects is estimated at up to 90 % of mothers with established rubella incidence in the first trimester. Malformation manifests in 10 - 20 % of those infected within the 16th week of pregnancy. In an early infection of the foetus there is a risk of abortion, intrauterine death, and childbirth with signs of rubella syndrome. Microcephaly, deafness, microphtalmus appear, or the disease manifests as late as in the first year of life.

Gregg´s syndrome is a manifestation of congenital embryopathy. It is characterized by the associated incidence of congenital heart defects (aortic and pulmonary stenosis, septum defects, etc.), eye disorders (glaucoma, cataracts, retinopathy), etc. Hepatitis, myocarditis, dysfunctions of the long bones metaphysis, etc. appear from the organ arrosions.

Diagnosis

It is not possible to make a diagnosis based on the clinical picture:

- **In pregnant women it is necessary to carry out a serological examination of the acute and convalescent sera - IgM specific antibodies** when rubella is suspected. **Positivity in the first trimester of pregnancy is an indication for interruption.** Recovery of the virus from the pharynx is successful a week prior to and two weeks after the exanthema manifestation.
- Diagnosis of the congenital rubella syndrome is confirmed by : the presence of IgM antibodies, the persistence of specific IgG antibodies (ELISA) after 6 years of age in children, or possibly by virus isolation from the nasopharynx and urine.

Agent

RNA rubella virus – Rubivirus genus, Togaviridae family, it is the only representative of the genus. The strains are antigenically uniform. It quickly loses infectiosity in the environment, and has hemagglutination properties. It is possible to recover it during infection from the nasopharynx, and blood, but also from urine and stools. For immunization the strain Wistar RA 27/3 is used which induces a good immune response. The vaccination strain persists in the nasopharynx for about 18 - 25 days after the vaccine administration, but a further spread doesn´t occur.

Source - reservoir

Man with a clinically manifest and inapparent form of illness within 5 days from the exanthema onset.

Route of transmission

By a droplet infection or close contact with the sick. Contact with nasopharyngeal secreta of infected persons.

Susceptibility

It is general in persons who haven´t experienced the infection. Newborns after clearance of transplacentary transmitted antibodies (approximately after 6 - 9 months from birth) are susceptible.

The experienced disease and immunization induce a long-term immunity (antibodies IgG). Approximately 10 % of young adults in non-vaccinated cohorts are susceptible to the rubella virus

The **IgM antibodies don´t produce in reinfection**, only the IgG antibody level increases.

Incubation period

14 - 23 days, most frequently 16 - 18 days. The virus occurs in nasopharyngeal secreta prior to the onset of clinical symptoms.

Infectious period

About a week before the exanthema appears and then 4 days after its onset. Newborns with congenital rubella syndrome may excrete the virus by nasopharyngeal secreta and urine for a period of 1 year (even without signs of the disease or malformations they are the source of infection for susceptible persons). Viremia occurs usually around the 6th day of the disease; with production of antibodies it disappears from the blood.

Incidence

Before the introduction of vaccination, rubella occurred in our country in 3- to 5-year cycles with a maximum in the winter months. Incidence reached 10,000 cases per year. Immunization of all children reaching two years of age was introduced in the Czech Republic in 1986. In 1995 764 rubella cases were reported, mostly from 10 - 19 years of age. **In 1998** 6,819 rubella cases in adolescents were registered, including soldiers in basic service (epidemic incidence).

Therapy principles
Symptomatic therapy. A complex treatment including a surgical intervention - correction of congenital defects- is performed in newborns with congenital rubella syndrome.

Preventive measures
Immunization with a live attenuated vaccine is the basis of prevention. An associated vaccine, TRIVIVAC, against measles, mumps, and rubella, or a monovalent vaccine, RUDIVAX, have been used in the Czech Republic since 1994. **Primary immunization:** it is administered at 15 months of age, subcutaneously in a single dose of 0.7 ml into the deltoid muscle region. Recall injections are given 6 - 10 months after the primary vaccination - see the chapter ″Epidemiology of measles″.
Twelve-year- old girls are vaccinated if they haven´t been immunized against rubella before. The rubella component of the vaccine induces the production of antibodies in more than 95 % of susceptible individuals. Adverse effects of the vaccination are not frequent, they occur on about the 8^{th} - 9^{th} day (swelling of the nodes, evanescent exanthema may occur). In persons over 12 years of age there may occur arthralgia or arthritis which gradually clears. **Immunoglobulin administration to pregnant women after exposure doesn´t prevent both viremia and infection**, it only modifies the clinical symptomatology. Infection of pregnant women, confirmed serologically, is an indication for interruption (positive IgM).

Measures at occurrence
- Notification of the sick and the congenital rubella syndrome. Serological confirmation of the diagnosis.
- Search in the focus - isolation of the sick at home, continuous disinfection, intensified medical surveillance of children in pre-school establishments for a period of 21 days from the exclusion of the sick children.
- Children from families where rubella has occurred may attend the establishments.
- Epidemiological surveillance.

EPIDEMIOLOGY OF VARICELLA

Clinical features and diagnosis

Varicella is an exanthematous childhood disease (90 % of cases) induced by the varicella zoster virus (VZV). It starts with a mild temperature elevation without prodromes, with a gradual eruption of exanthema in waves. It is possible to observe macular, papulose and vesicular morphea and drying crusts at the same time. A more explosive prodromal phase, a richer eruption of rash first appears on the trunk and hairy part of the head. It is most frequently expressed on the trunk and upper limbs. A further eruption by efflorescence usually appears after 3 days.
The virus survives in the organism after the disease clearance, and its reactivation manifests as herpes zoster. In immunocompromised children varicella proceeds with affection of various organs - including CNS, with an incidence of paresis.
Complications - a secondary infection by efflorescence results in impetiginization. Neural disorders are the most frequent general complications. Varicelliform encephalitis occurs in 0.05 - 0.1 % of the sick and manifests mainly by cerebellum symptoms. Primary intersticial varicella pneumonia develops during the first days of the rash. Infiltrates in the lungs survive long-term.

Herpes zoster - a recurrent infection is induced by activation in some sensory ganglia. It manifests with paresthesia associated with a dermatome affection. It preceeds the rash for several days. The vesicles develop in skin innervated from the respective segment, closely arranged on a reddish surface. It is associated with neuritis and neuralgia in the innervated region. The virus spreads centrifugally through the neuron axis. The nerve-endings transfer to the skin inducing an exanthema similar to varicella. The eruption lasts longer than in varicella and produces thicker crusts with subsequent cicatrices. It occurs in an **abortive form** (several vesicles), **hemorrhagic, and gangrenous forms.** Bacterial superinfection is analogous as in the primary disease. Healing in non-complicated cases occurs within three weeks. An anamnestic immune response usually prevents dissemination of the infection. It usually occurs due to immunodeficiency.
Herpes zoster ophthalmicus is a feared manifestation. It affects both the conjunction and cornea. The first trigeminnal branch is usually affected in 15 %. The thoracic and lumbar segments are affected in more than 50 %. Herpes zoster in children is mostly indolent. More extensive dermal manifestations with long-lasting neuralgia occur in elder individuals.
Disseminated herpes zoster develops in immunosuppression, tumorous diseases, and AIDS. Not only the skin is affected but also the lungs, liver, CNS, and zoster encephalitis develops.

Herpes simplex - infection is characterized by a primary lesion, a latent phase, and a tendency to spread. The primary HSV infection (about 10 %) has a manifest course with a low-grade fever, malaise, and gingivostomatitis. The HSV type 2 induces aseptic meningitis and radiculitis. Newborns are threatened at birth by a disseminated infection in the genital localization of herpes simplex in mothers.
Diagnosis is based on the clinical picture and demonstration of multinucleate cells with intranuclear inclusions in skin scrapings. Material from the dermal lesions serves for the virus isolation on diploid cells. A cytopatic effect develops gradually. It is possible to detect viral antigens in cells by the IF method. Serological detection of antibodies: ELISA, KFR, indirect IF.
In a differential diagnosis of varicella it is necessary to differentiate: enteroviral vesicular exanthema, allergic vesicular exanthema, insect bites, syphilis, and disseminated herpes simplex.

Agent
Varicella zoster virus (VZV), the Herpesviriade family.
The DNA virus replicates in the nuclei of cells, HSV - type 1 induces herpes simplex, HSV-type 2 induces herpes genitalis.

Source - reservoir
Man only, all herpetic viruses propagate primarily in the mucosa of the nasopharynx.

Route of transmission
Air-borne in close contact with the sick, HSV-type 2 sexually transmitted. Transmission from the infected mother onto the newborn in birth canals.

Susceptibility
Susceptibility to the herpetic virus is general. The virus propagates on the mucosa of the nasopharynx. After replication in the lymph nodes viremia occurs. A further replication proceeds in the macrophages and mononuclear cells. The virus spreads from the endothelium of the capillaries into susceptible cells of the skin and mucosa.

Incubation period
9 - 23 days; in herpes simplex 2 - 12 days.

Infectious period
From the last day of the incubation period up to conversion into crusts by efflorescence. Most of the primary infections proceed manifestly.

Incidence
Global incidence. Varicella infection develops in approximately 70 - 80 % of children under 15 years of age. It occurs epidemically in susceptible groups of children. In the period 1995 - 1998 48-50 583 cases of varicella were reported. In the same period 6,000 cases of herpes zoster were reported yearly.

Therapy principles
Specific treatment by acyklovir is indicated in children seriously threatened by immune insufficiency, preventive varicella pneumonia, and herpes zoster.

Preventive measures
- Protection of immunosuppressed persons and newborns prior to exposure.
- **Immunization by the attenuated vaccine Varivax (MSD, VARILRIX-(S-K-B)).**

The vaccination is carried out abroad. No vaccine has been licensed or is in licensing proceedings in the Czech Republic. **Vaccination procedure:** a single dose is administered subcutaneously in the amount of 0.5 ml, and it repeats after two months in individuals who haven´t developed antobodies. Vaccination is recommended for immunization of children at risk from 12 months to 12 years of age. **Vaccination is not recommended in children under 9-months old.** A protective effect is reached in 70 - 90 %. Antibodies persist for 3 - 6 years. **Indication:** Individuals suffering from lymphoproliferative diseases, persons with chronic nephritis,and individuals who have to undergo transplantation of the liver, kidneys, and marrow. Immunization at remission is carried out in the vaccination of children with lymphoblastic leukemia. Two doses are administered in a two month interval. Side effects: eruption of a fine-spotted rash around the site of injection or on other sites, (approximatelly in 70 %).

Protection of contacts: within 96 hours of exposure it is possible to administer varicella zoster immune globulin (VZIG) which prevents the disease or substantially modifies its course. Globulin is administered within 48 hours after delivery of infants born to mothers with varicella. Specific gamma globulin is used in the USA for protection in severe immunodeficiencies (AIDS). An early specific treatment in infections induced by VZV influences the incidence of severe complications and shortens the soreness time.

- The epidemiological search for contacts and the sources of infection has a low practical meaning.
- Prevention of herpes genitalis - use of condoms significantly reduces the risk of infection.

Measures at occurrence

- Notification, isolation at home for non-complicated cases.
- Isolation of children for 5 days after the eruption by efflorescence.
- Intensified medical surveillance of children´s groups for 21 days.
- To prevent contacts with immunosuppressed children.
- Non-susceptible children may attend pre-school and school establishments.
- In highly susceptible contacts, according to the decision of the epidemiologist, to administer specific globulin and specific therapy: zovirax, farmacyklovir.
- Patients with herpetic illness mustn´t come into contact with newborns, individuals with eczema, burns, and immunosuppressed persons.

EPIDEMIOLOGY OF MUMPS - VALID VACCINATION

Clinical features and diagnosis

An acute viral disease which begins with fever with a striking swelling of the parotid gland and other salivary glands. Involvement may be unilateral or bilateral (hypoglossal or submandibular glands).

- **Aseptic meningitis** - an involvement of CNS which manifests by meningoencephalitis may occur already before swelling of the parotid gland. Etiological diagnosis is then difficult. Pancreatitis may occur in 4 %.
- **Orchitis** - is usually unilateral, occurs approximately in 15 - 30 % of infected men, oophoritis in 5 % of the fertile age women.

The course of mumps may further be complicated by inflammation of the peripheral nerves, mastitis, nephritis, thyroiditis, and pericarditis. The occurrence of parotitis in the first trimester of pregnancy may cause miscarriage - congenital malformations of the foetus have not been reported. The infection proceeds inapparently in 30 - 40 % of cases.

Diagnosis is made on the basis of the epidemiological history together with the clinical picture supplemented with a serological examination (HIT, ELISA, KFR) IgG antibodies in acute and convalescent-phase sera of the sick. Isolation of the virus is carried out on tissue cultures from the sampled material (blood, saliva, urine, and liquor) taken during the acute phase of the disease.

Agent

The RNA virus of mumps belongs to the paramyxovirus group; antigenically, it is related to the parainfluenza viruses. It occurs in one antigenic type only. Man is a natural host. It can be grown in embryonated hen eggs and tissue cultures of primate origin.

Source

Only man with a clinically manifest and inapparent form of parotitis from the last days of the incubation period to 10 - 14 days after the first symptoms.

Route of transmission

By droplet infection, close contact with saliva of the infected person, and only rarely by contaminated objects.

Susceptibility

General. Immunity is long-term after the experienced infection, both manifest and latent. Transplacentar antibodies persist several months in newborns. Manifestation of epidemic parotitis is approximately 50 %.

Incubation period

In the range of 12 - 25 days; on average 18 days.

Infectious period
The maximum infectiosity of the sick is reported 48 hours before the disease begins. Isolation from saliva is successful 6 - 7 days before and 9 days after manifestation of the disease.

Incidence
Parotitis proceeds mostly asymptomatically. Serological surveys document that 80 - 85 % of adults have positive antibodies. Mumps are of a seasonal character with the maximum incidence in the winter and spring months. Pre-school and school-age children are most frequently affected. The incidence of parotitis significantly decreased after introduction of a regular immunization in the Czech Republic in 1987, morbidity has shifted to older age cohorts. In 1995 5,821 cases were reported in 10 – 14 year olds. In 1998 410 cases were reported.

Therapy principles
Treatment is symptomatic. Analgetics, antipyretics are administered, compresses are put on the parotid gland, etc. An antiedema therapy is a part of the treatment in meningoencephalitis. A short-term administration of corticoids is recommended when orchitis develops.

Preventive measures
Immunization with the attenuated virus vaccine is essential. It has been used since 1987. A combined vaccine against measles, mumps and rubella , TRIVIVAC (MMR), has been used in the Czech Republic since 1994. The parotitic vaccine component is represented by the Jeryll Lynn strain propagated on chicken fibroblasts.
A monovalent vaccine, PAVIVAC, against mumps is used for vaccination of adolescents and adults who have not been vaccinated or have not experienced parotitis.

Primary vaccination: Children at 15 months of age are vaccinated with a triple vaccine TRIVIVAC, a single dose of 0.7 ml is administered s.c. into the deltoid muscle or the anterolateral region of the femoral muscle. The parotitic component of the vaccine induces the production of antibodies in approximately 90 % of susceptible individuals. **Booster injections** are administered 6 - 10 months after the primary vaccination. **Adverse reactions:** elevated temperature, exanthema in approximately 15 % of vaccinees (it is attributed to the measles component of the vaccine).
The immunity conferred by vaccination is long-term. Revaccination against mumps appears useful. Similarly, as in measles, the disease may occur in persons regularly vaccinated at a drop of immunity, especially in adolescents aged 15 - 18 years. It is possible to administer the TRIVIVAC and MMR vaccines both in non-immune and immune persons (it is not necessary to detect antibodies).
A proper vaccine storage and handling, observance of the temperature regimen (+2 to +8°C) from the sampling up to the administration of the preparation is a precondition for effective vaccination.

Measures at occurrence
- Notification of the sick, serological confirmation of the diagnosis by paired sera examination.
- Epidemiological search in the focus:
  - Isolation of the sick at home for a period of 9 days from the disease onset.
  - Intensified medical follow-up in children´s establishments for 21 days from exclusion of the ill child.
  - Nonsusceptible children may attend the establishments.
  - Susceptible children from families where mumps appeared may again attend the establishment from the 21st day after the last contact with the sick.
  - Continuous disinfection.
  - Administration of immunoglobulin and vaccination of contacts is ineffective.

TRANSMISSIVE INFECTIONS
GENERAL REVIEW

Transmissive infections (arthropod-borne infections) form a wide group of infections dependent on ecological factors in the environment. The epidemiology of individual infection studies complicated regularities of the process, which requires a complex team cooperation by epidemiologists, infectologists, clinical specialists, and biologists in the widest sense of the term.
The following factors apply in the spread of transmissive infections: climatic, biological and abiotic. Factors of the environment influence one another which results in formation of ecological conditions, i.e. **a suitable environment for the survival, persistance, and spread of infections**. The vectors in transmissive infections **range with the class of insect or the order of mites**. It always concerns an **active** transmission when the

causative agents of infection propagate in the arthropod organism or undergo a certain phase of the evolutionary cycle, which is essential for further transmission.
Man is either a necessary link of the infectious agent circulation (e.g., in malaria and spotted fever), or he is a random, often blind, link of the whole process (e.g., in tick-borne encephalitis, etc.).
Transmissive infections with a natural focus represent a significant group of the arthropod-borne infections. It concerns infections which occur in certain localities without the direct participation of man who only secondarily becomes a link for their circulation. They are the infections which occur in a certain biotype with a corresponding biocenosis:

- They occur in the biotype without the participation of man.
- The causative agents circulate in a defined biocenosis. Transmission is carried out through the mediation of one or more species of arthropods.
- Man is a blind link in the process in a number of infections

Central European tick-borne encephalitis and tularemia are significant infections with natural foci in our country. Globally we classify there plague and a number of viral and rickettsial infections which occur in the subtropics and tropics. From the transmissive infections, **malaria has no features of a natural focus**. It is still one of the main global health problems due to its high incidence in the subtropics and tropics.

Arbovirus infections
To arboviruses belong viruses of various families which are arthropod-borne. Arboviruses infect various vertebrates who are reservoirs of infection. Their transmission is mediated by an insect vector. Man is in most cases only a random link in the chain.
Arboviruses propagate in the insect vector, they remain infectious for their whole life, and **communicate infection transovarially** to the off-spring. **A vertical transmission** enables circulation of the infection in natural foci. Ecological factors (climate, soil conditions, character of the fauna and flora) influence the incidence of the reservoir animals and specific insect vectors in various regions of permanent circulation of various arboviruses. In mild climatic zones arbovirus infections proceed from the early summer till late autumn mostly with a varying clinical symptomatology.

Pathogenesis of arbovirus infections
The virus is introduced into the organism via the sucking tract of an insect. Then propagation in the regional lymph nodes occurs. In this phase the disease may proceed latently or viremia and a further spread of the infection occur. In a secondary viremia the disease manifests with fever and unspecific influenzal symptoms. Propagation of the virus into the target organs (liver, spleen, CNS, etc.) occurs unless inhibition of the proliferation appears in this stage. **More than 100 species of arboviruses are known at present** which induce infection in humans:

a) Togaviridae (the Alphavirus genus)
Chikungunya - vector mosquitos
Eastern equine encephalitis - vector: mosquitos
Venezuelan equine encephalitis - vector: mosquitos
Western equine encephalitis - vector: mosquitos

b) Flaviviridae (Flavivirus)
Dengue fever 1 - 4 – mosquito borne
Japanese encephalitis type B - vector: mosquitos
St Louis encephalitis - mosquito borne
Kyasanur Forest disease - tick borne
Omsk haemorrhagic fever - vector: tick
Tick-borne encephalitis - European subtype - vector: tick
Far East Russian encephalitis - vector: tick

c) Bunyaviridae (Bunyavirus)
Group A - vector: mosquito
Group C, febrile states - vector: mosquito
Bunyamvera group, febrile states with rash - mosquito borne
California group, causes encephalitides - vector: mosquito
Ťahyňa, febrile states - mosquito borne
etc.

d) Phlebovirus (Sandfly group)

The virus causes febrile states and encephalitis.

e) Nairovirus
Induces hemorrhagic fever.

f) Reoviridae (Changuinola group viruses)
The Kemerovo group causes febrile states - tick borne.

g) Rhabdoviridae
Vesicular stomatitis Indiana virus and other ungrouped viruses.

Transmissive infections induced by Rickettsia
Infections induced by the genus **Rickettsia** and **Coxiella** which can be divided into the following groups:

Group 1	**Spotted fever**
	Classical endemic spotted fever (Typhus exanthematicus)
	Endemic purpura fever
Group 2	**Tick-borne purpura fever**
	Rocky Mountain spotted fever
	Marseilles fever
	South African tick-bite fever
	Siberian tick fever
	Indian tick fever
	Queensland tick typhus
Group 3	**Mite-borne rickettsioses**
	Japanese river fever (Tsutsugamishi disease, Scrub typhus)
	Rickettsial pox
Group 4	**Q - fever**
Group 5	**Volhynia fever**

A series of tropical diseases belongs to the transmissive infections: leishmaniasis, trypanosomiasis, filariasis, etc. They are rarely diagnosed in our country (as imported diseases).

EPIDEMIOLOGY OF EUROPEAN TICK - BORNE ENCEPHALITIS

Clinical features and diagnosis
Tick-borne encephalitis is a viral disease of the central nervous system which manifests a varying clinical picture from inapparent infection to a severe affection of the CNS.
Abortive form - is the lightest clinical form which usually proceeds as a viraemic phase and is often unrecognized. A **2-phase course** is typical for the disease. After the first phase of viraemia, a 4-14 day period of relative inactivity follows when the patient feels subjectively well. High fevers and development of CNS affection symptoms is characteristic for the second phase. We can define the following forms according to the severity of affection:

- **Meningitic** - resembles the clinical picture of serous meningitis. The patient is photophobic, with headache, pharyngitis or bronchitis.
- **Encephalitic** - symptomatology results from involvement of the grey and white matter. It is associated with sleeping disorders, memory failure, and a lack of concentration, but also impairment of consciousness - up to coma. The nerves of the head affected: n.IV, n.VI, and n.VII.
- **Encephalomyelitic** is characterized by involvement of the anterior horns, most frequently in segments C 5-7, less often in L 2-4. Development of peripheral paralysis occurs which may manifest in various phases of the disease course.

- **Bulbocervical** - is the most severe form of the disease. The pathological process is limited to the cervical segments with subsequent failure of the centres essential to life.

Diagnosis is made on the basis of the epidemiological history and clinical symptoms. The disease is confirmed by a significant rise in specific antibodies in the serum (CFR or HI test). It is possible to use detection of IgM antibodies in the serum for a prompt diagnosis.

Agent
A virus of the group of Flaviviruses is the causative agent. The tick-borne encephalitis complex comprises viruses and possibly strains which have the same antigenic structure. It is best to perform the virus isolation in the viraemic phase on sucking white mice.

Source - reservoir
Mouse-like rodents, small mammals, birds, but also larger mammals (sheep, goats). All stages of the tick life cycle are the reservoir and simultaneously vector. In our country it is the **Ixodes ricinus** which transmit the infection to other animals - squirrels, moles, hares, deer, etc. Ticks sucking infected blood are infected for their lifetime (about 3 years). **Transovarial transmission of the virus** to other generations is known in ticks. Domestic animals - goats, sheep, cattle - may be inapparently infected when grazing in the open and **excrete the virus by milk** in the viraemic phase.

Route of transmission
The transmission occurs via the infected tick cling. A possible route of transmission is also by the **raw milk** of infected domestic animals. The disease is not transmitted from man to man.

Susceptibility
Susceptibility to the tick-borne encephalitis virus is general. After experiencing the disease, including a latent form, life-time immunity is conferred.

Incubation period
Incubation usually ranges from 7 to 14 days.

Incidence
The Central European tick-borne encephalitis classes with typical infections with natural foci. The foci in the Czech Republic occur especially in the region of Beroun, Strakonice, Karlovy Vary, but also around Brno, Olomouc, Hradec Králové, etc. In 1993 621 cases were reported – an incidence rate of 6.1 per 100,000 inhabitants a year, in 1995 - 744 cases, in 1998 - 422 cases. It occurs in various countries of Europe - from Scandinavia to the Mediterranean. The tick-borne encephalitis Eastern subtype viruses designated the Russian spring-summer encephalitis - occurs in localities east of the Urals. They induce a severe meningoencephalitis with a high mortality rate - up to 30 %.

Therapy principles
Therapy is symptomatic. It depends on the clinical course of the disease.

Preventive measures
- Personal protection against ticks in endemic regions- repelents, suitable clothes, search for ticks, etc.
- **Early removal of the clung tick - significant for reduction of the infectious virus dose.**
- It is possible to use **passive immunization** - administration of immunoglobulin within 3 days after the tick´s cling: preparation **FSME-BULIN inj**. A dose of 0.05 ml/kg of the body mass is administered within 48 hours after the tick´s cling or in the amount of 0.2 ml/ kg from 48 to 96 hours after the exposure.
- **Active immunization** by a killed virus vaccine containing a purified virus of tick-borne encephalitis is available in the Czech Republic.
  - Encepur K - for children from 18 months to 12 years of age. A dose of 0.5 ml is administered i.m. at intervals 0, l-3, and 9 - 12 months. Booster injections after 3 years. Encepur for adults - administration at the same intervals. A short regimen - administration of 0.5 ml i.m. at intervals days 0, 7, 21.
  - FSME-IMMUN INJECT (Austria) - 0.5 ml administered i.m. at intervals of month 0, 1-3, the 3rd dose at 9 - 12 months. Booster injections after three years.

Measures at occurrence
- Disease notification.

- Isolation and treatment in the infection ward.

EPIDEMIOLOGY OF LYME DISEASE

Clinical features and diagnosis
Lyme disease in our country occurs in the early and late phases.
Early phase
A typical symptom is a spot of varying intensity which occurs in the site of a clung tick - **erythema migrans**. The spot gradually increases to various sizes with a demarcated border. It usually reaches on average a size over 5 cm; abd production occurs within several days. Sporadically it is possible to observe eruption of a multiple erythema. The erythema occurs in the early phase in 70 - 80 % of the infected. The early symptoms are fever, shivering, fatigue. In children (less often in adults) we can find on the skin of the nose or on the auricle of the ear a glomus sized 1 - 5 cm with swelling of the regional lymph nodes. Weeks later some patients may develop other manifestations - particularly affection of the neural, joint, and cardiovascular systems.
Neural symptoms - serous meningitis, encephalitis, myelitis. Hypesthesia, motility disorder, and paralyses of the head nerves, especially of the buccinator muscle, and muscle ache of the limbs occur. The symptoms persist for several weeks to months and may gradually develop into a chronic phase.
Lyme arthritis - manifests by migrating joint aches. It concerns inflammatory involvement of the tendons, their sheaths, and attachments of the ligaments and tendons into the bones and muscles.
Involvement of the heart muscle - symptoms resembling myocardial infarct may manifest.
Ophthalmic manifestations of Lyme disease - the symptoms are heterogenous, they occur in all phases of the disease: conjunctivitis, inflammation of the cornea of various degree, retinitis. The first symptom of Lyme disease is often involvement of nerves VI, less frequently n.III and n.IV.

Late phase
It manifests 6 - 15 months after the exposure with affection of the skin, joints and neural system. The late dermal manifestations are designated as **acrodermatitis chronica atrophicans**. It proceeds in two phases: the first - inflammatory, and the second one - atrophial. Simultaneously affections of other organs occur - most frequently arthritis, fatigue, and peripheral neuropathy. An articular involvement has features of chronic arthritis.

Diagnosis
It is based on the epidemiological history, clinical symptomatology, and laboratory examination (ELISA, IFA, Immunoblotting tests). A direct examination is possible using electron microscopy. Detection of antibodies from the serum is performed at intervals of 6 - 8 weeks. The immune response is very variable. The results of the serological examination in the early phase of the disease are mostly negative. The IgM antibodies appear first, then the IgG antibodies which persist for many years. In early borreliosis it is possible to detect antibodies in liquor.

Agent
A motile spirochete Borreelia burgdorferi sensu lato is the causative agent. The following genomic groups are designated:
- **Borrelia burgdorferi sensu stricto**
- **Borrelia garinii**
- **Borrelia afzelii**
- **Borrelia japonica**

Borrelia burgdorferi sensu stricto occurs all over the world, but it is the only one in the USA.
B.b.sensu lato has a rich antigenic structure. The surface antigens OspA, and OspB have variable structures. A further antigen is flagellar flagellin p41. Antigen p60 is common for numerous other bacteria. The **OspA antigen** is the main immunogen in the early phase of the immune response. The antigen p100 applies in the late phase of immunity. Intracellular survival of borrelia has been detected in vivo and in vitro, even after a treatment with antibiotics.

Source - reservoir
The infection reservoirs are wild mice-like rodents, wood animals, birds, the Ixodes ricinus tick and its developmental stages. **Man is one of the hosts in all developmental stages of the tick.** The infection may be transmitted to dogs, horses and horned cattle, in which it manifests as a system disease.

Route of transmission
Borreliae are transmitted in our country by ixodid ticks - **Ixodes ricinus and its developmental stages**. A tick is infected by borreliae by feeding on animals. The borreliae propagate in the intestines of ticks. In the course of the ticks´ feeding they reach the salivary glands. The risk of infection depends on the time of the ticks´ feeding - the longer it is, the higher the risk of infection. **Nymphs are most consequential for transmission of the infection.** Approximately 20 % of the sick with borreliosis report being bitten by other insects. The risk regions of incidence are broadleaved or mixed forests, and woodland parks. We can find infected ticks even in town parks. The immunity rate of ticks in the Czech Republic ranges in individual regions from 1 to 30 %.

Susceptibility
It is probably general. The highest incidence is reported in the age cohort 45 - 55 years, more frequently in women. Borreliosis may proceed as a latent infection with an increased level of antibodies without clinical manifestations. In our population antibodies against Lyme borreliosis in our population have been detected in 20 - 60 % of healthy individuals. A reinfection is possible.

Incubation period
7 - 10 days (a range of 1 - 180 days) in erythema migrans. In a disseminated early form it is 20 - 65 days, and 6 - 12 months to several years in the late form.

Infectious period
A direct transmission from man to man has not been detected.

Incidence
It occurs in the whole mild zone depending on the ticks´ distribution. The incidence rate in the Czech Republic was 61.8 per 100,000 inhabitans in 1995, and 21.4 in 1998. The infection distribution is not uniform; a higher incidence is found in the regions of Klatovy, Příbram, Plzeň -South, Šumperk, Cheb, and Tachov. Lyme disease occurs during the whole year, with a maximum incidence in the summer months. It has a typical seasonal character. Erythema migrans is the most common clinical form.

Therapy principles
Doxycycline, erythromycin or azitromycin are administered for mild forms of Lyme disease. Penicillin G in high doses and cephalosporin of the 3rd generation are administered for severe forms.

Preventive measures
- The vaccine is in the clinical trial phase.
- Health education about the routes of transmission and possibilities for protection against ticks (to wear suitable clothes, to use repelents, to repeat spraying after several hours, to inspect the whole body after returning from the forest, to remove the clung ticks, to avoid a bare finger touch with ticks, and to disinfect the site, e.g., by jodisol, prior to manipulation of a tick and after its removal.

Measures at occurrence
- The disease is notifiable.

HEMORRHAGIC FEVERS

Hemorrhagic fevers form a large group of serious infections which occur in the tropics where they exist as **natural enzootic foci**. The causative agents are viruses communicable to man, transmitted either by various ectoparasites or by close contact with infected animals. Some viruses under specific conditions may **adapt from their natural animal reservoirs to interhuman transmission**. The infection may be imported to any country where no natural animal host occurs due to travelling and shortening of the intercontinental transport time. Especially dangerous is the introduction of the **Ebola virus, and the Lassa and Marburg virus fevers**. For their incidence an obligatory notification on the international level via the WHO applies, as does an arrangement of strict quarantine measures. The disease is characterized by an abrupt onset with a high fever, a marked weakness, fulminating headache, melalgia, and diarrhea. In the clinical picture symptoms related to a **hemorrhagic diathesis** caused by inflammatory alterations of the capillaries, thrombocytopenia, impairment of clotting, etc. dominate.

The **case-fatality rate** is high in severe forms of hemorrhagic fevers; in Ebola fever and Marburg Virus fever it **reaches 50 - 90 %**.
The diagnosis is based on the clinical picture assessment. An **express virological examination** is necessary for an etiological diagnosis. It is based on direct detection of the virus by electron microscopy or by virus isolation from the blood and hepatic tissue. The IgM antibodies are detected in a serological examination by indirect immunofluorescence (when using specific antigens).
Hemorrhagic fevers include the following: **Lassa fever, Ebola, Marburg fever, dengue, yellow fever, Crimean hemorrhagic fever, Omsk hemorrhagic fever, Kyasanur Forest fever, Chikungunya, Bolivian hemorrhagic fever, Rift Valley fever, and diseases induced by hantaviruses.**

EPIDEMIOLOGY OF LASSA FEVER

Clinical features
An acute viral disease which begins with an abrupt onset of a high fever, acute headache with vomiting and diarrhea. A shock condition quickly develops accompanied by symptoms of dermal hemorrhages. Abdominal pain, encephalopathy and brain edema occur.

Agent
Lassa virus is classified as a member of the Arenaviridae family.

Source - reservoir
Wild rodents, Mastomys natalensis in West Africa.

Route of transmission
Via an inhalation route by infectious aerosol, in close contact with the feces of rodents. Transmission of the infection from man to man is possible in a hospital environment, after contact with the blood and urine (possible inoculation by a contaminated needle), and pharyngeal secreta of the sick.

Susceptibility
General.

Incubation period
6 - 21 days.

Infectious period
Transmission from man to man during an acute febrile phase when the virus is present in the nasopharynx. The virus is also present in the urine of the sick for 3 - 9 weeks.
Incidence
In the countries of West and Southern Africa (Guinea, Nigeria, Zimbabwe, Congo (Kinshasa), etc.).

Therapy principles
For treatment it is possible to use ribavirin, virazol i.v. in a dose of 30 mg/kg for a period of 6 days; maintenance dosage is lower.

Preventive measures
A consistent protection of persons against rodents. To observe safety measures at work with the virus in the laboratory.

Measures at occurrence
- Notification on an international level (WHO).
- Observance of strict epidemic measures (protective clothes, mouth-screen, surgical gloves, and disinfection measures).

EPIDEMIOLOGY OF EBOLA AND MARBURG FEVERS

Clinical features
A resious acute viral system febrile disease with an abrupt onset. Dominant symptomatology: generalized prostration, acute headache and muscle ache, vomiting, diarrhea. After several days a maculopapular rash erupts

and hemorrhagic impairment of the liver, kidneys, heart and CNS develops. The case-fatality-rate in Ebola fever is about 50 - 90 %, in Marburg fever about 25 %.

Agent
The Ebola and Marburg viruses are classified as Filoviridae. The Ebola virus is antigenically different from the Marburg virus. EBO virus strains from Congo (Kinshasa), The Ivory Coast and Sudan differ in their antigenic structure.

Source - reservoir
An animal reservoir (not yet identified) is the primary source for man. **Man is the source of infection for his milieu especially during hospitalization.** Transmission of Marburg fever occurs nearly solely in laboratory conditions.

Route of transmission
Transmission from a natural host (animal) to man has not been clarified yet. Transmission from man to man occurs by close contact with biological material of the sick (blood, urine, secreta or tissues). It is also impossible to discount a sexually transmitted route of infection because the virus was detected in the sperma of the sick.

Incubation period
Incubation periods range from 2 to 21 days in Ebola, and 3 - 9 days in Marburg fever.

Susceptibility
General.

Infectious period
It lasts for the whole time of the illness, while the virus is present in the blood and secreta.

Incidence
The first Ebola fever cases were diagnosed in equatorial Africa (Sudan and Congo (Kinshasa)) in 1976. Marburg fever was first recognized in 1967 when laboratory workers in Marburg, Germany, and Yugoslavia became infected after contact with green monkeys - Cercopithecus aerhoips. About 300 cases were reported in Congo (Kinshasa) in 1997. The epidemic was managed by CDC workers from Atlanta.

Therapy principles
A symptomatic treatment or possibly convalescent immuneglobulin which should be administered within 7 days.

Preventive measures
A maximum consistent action and observance of an anti-infection regimen during laboratory work with monkeys and when nursing the sick.

Measures at occurrence

- Notification of the sick on an international level, isolation of the sick in the barrier systems.
- A safe disinfection of biological materials, secreta and objects which might be contaminated.
- Isolation and follow-up of contacts for the maximum incubation period.
- Sexual abstinence for a period of 3 months till a negative result of the virus isolation from the sperma is obtained.

EPIDEMIOLOGY OF HANTAVIRUS DISEASES

Hantaviruses induce infections of rodents all over the world. Some of them are transmittable to man and cause inflammatory alterations in the endothelioma of the capillaries. They result in a **rise in vascular permeability, development of hypotension shock, and hemorrhage.**

Hemorrhagic fever with renal syndrome

Clinical features
The disease was already described during the WW1 and WW2, and also later on during the Korean War (1951, the virus isolated in 1976) - Hantaan virus strain 76-118. **Symptomatology:** fever, headache and muscle ache, nausea, in severe cases during high fevers there appear petechia, nasal and gingival hemorrhage, and a blood ingredient is present in the vomitus and stools.
After a febrile phase lasting 3 - 7 days, **hypotension, oliguria, a shock status with hemorrhages and acute insufficiency of the kidneys** develop. This status is accompanied by a characteristic severe back-ache. In severe cases uremia with meningeal signs and unconsciousness appears. The case-fatality rate ranges from 5 to 20 %.
Laboratory diagnosis – the diagnosis is confirmed by detection of IgM antibodies using the ELISA method, and by a complex biochemical examination. Direct detection of the agent - isolation on tissue cultures.

Agent
Viruses of the enus Hantaanvirus, classed with Bunyaviridae.
- Hantaan virus (incidence in Asia and Europe)
- Dobrava virus (the former Yugoslavia region)
- Puumala virus (incidence in Europe)
- Seoul virus (cosmopolitan incidence), etc.

Source - reservoir
Infected rodents. Carriage in the Czech Republic was detected in several species of rodents, most frequently in vole Microtus arvalis.

Route of transmission
The upper respiratory tract is the portal of entry. **Man is contaminated by infectious aerosol** at contact with the excreta of rodents, excreted in the environment (saliva, stools, urine).

Susceptibility
General. The disease proceeds under various clinical symptomatologies depending on the virulence of the respective strains. The confered immunity is probably life-time.

Incubation period
From several days to two months.

Incidence
The disease has a character of infection with natural foci. It occurs all over the world. A high incidence of cases is reported in China (40-100,000 cases yearly) and in North Korea (about 1,000 cases). Most cases manifest in the spring season and early summer.
Endemic foci of Hantaan virus in Europe are in Finland, the former Yugoslavia, etc. Usually individuals from rural regions are affected. Infections have a varying severe course.
An endemic focus in the Czech Republic was detected in the Břeclav region, in Slovakia around Malacky. A case of imported infection from the former Yugoslavia was confirmed in a UNPROFOR unit soldier in 1995.

Therapy principles
A symptomatic treatment is carried out depending on the clinical status - rehydration, anti-shock treatment, hemodialysis, etc.

Preventive measures
To secure buildings against rodents getting access to stores of food, cereals. To prevent the generation of secondary aerosol in locations of rodent incidence. Suitable rodent control and disinfection measures.
Measures at occurrence
Obligatory notification, epidemiological search in the focus and realization of effective epidemic measures.

Hantavirus disease with pulmonary syndrome

Clinical features
It is an acute, febrile disease associated with muscle aches and signs of digestive tract affection. Respiratory complaints and hypotension quickly appear. The disease quickly progresses and cardiogenic shock develops. The case-fatality rate ranges from 40 to 50 %. Convalescence in survivors proceeds relatively quickly.

The diagnosis is confirmed by detection of specific IgM antibodies using the ELISA method during hospitalization. It is possible to use PCR for a direct detection.

Agent
In connnexion with pulmonary syndrome hantaviruses were isolated: **Sin Nombre virus, Black Greek Canal virus, etc.**

Source
Small rodents excreting the virus through urine and stools.

Route of transmission
The same as for hemorrhagic fever with the renal syndrome.

Susceptibility
General. The inapparent course of infection has not been described so far.

Incubation period
Ranges from several days to 6 weeks.

Incidence
The disease was recognized in New Mexico and Arizona in 1933, and later in other parts of North America.

Therapy principles
Monitoring respiratory functions with the aim of preventing pulmonary edema, symptomatic therapy of the cardiogenic shock.

Epidemiological measures
The same as for hemorrhagic fever with the renal syndrome.

EPIDEMIOLOGY OF TYPHUS FEVER

Clinical features
It is a serious rickettsial disease also called **epidemic spotted fever**. The disease usually has an abrupt onset with signs of shivers, chill, high fever (40 - 41°C), headache. **Eruption of macular exanthema occurs on the 5^{th} - 6^{th} day**, usually on the chest and upper limbs. It doesn´t affect the facial side of the head, palms, and soles. The typhous rash reaches a size of 3 - 5 mm, and is of a deep-red colour. It fades away after a few days, or due to hemorrhages it alters to a dark-red rash. The general status worsens with exanthema eruption. A stoporous state of the sick develops. Numerous bacterial complications may accompany the disease course. Rickettsiae multiply in the endothelium of the capillaries; they induce production of small thrombi. A focal necrosis may occur.
Brill - Zinsser disease is a recrudescent, milder disease which occurs several years after the primary infection. Rickettsiae persist long-term in the endothelial cells. The disease manifestation occurs during weakened immunity of the individual. In non-complicated cases, fevers usually cease after two weeks. A full recovery occurs usually within two months. Incidence of that form under present European conditions is rare (significance of the epidemiological history). In an untreated form of epidemic spotted fever the case-fatality rate increases (a range of 10 - 40 % and more) with a severe course and aging of the sick.
The diagnosis is based on the clinical picture and epidemiological data (lice infestation of the patient and the persons of his closest environs). Immunofluorescence methods are used in laboratory diagnosis. A direct fluorescence is used for identification of the isolate (**detection of capsular antigen and cellular wall antigen**). For detection of antibodies it is possible to use the complement fixation test and agglutination reactions.

Agent
Rickettsia prowazeki - an obligate intracellular parasite. Multiplication of rickettsiae in the endothelial cells of the peripheral capillary system induces vasculitis and results in lysis of the cells.
Rickettsia typhi is a species causing murine or endemic typhus fever. The disease occurs in regions of frequent contacts of man with rodents who are the primary hosts. **Rickettsiae are transmitted to man by fleas.**

Source - reservoir

A sick man is the source of infection and he is also a reservoir of rickettsiae in interepidemic periods.

Route of transmission
The infection is transmitted by the clothes louse (or body louse) - Pediculus humanus corporis. The louse becomes infectious after feeding on the blood of the sick in the acute phase of the disease. Rickettsiae multiply in the louse´s intestine and excrete together with its droppings. The infection occurs due to rickettsiae penetration in the site of the bite, and microtraumata by the infected droppings of the louse. Lice usually leave the ill patient and search for a new host. Sporadically an **inhalation transmission of the infection may apply** by dust containing feces of the infected louse. Transmission by the blood of the sick is also possible.

Susceptibility
Susceptibility to the disease is general. A post-infectious immunity is conferred after recovery from the disease. **A latent infection** may persist in some cases resulting in a late recurrence after many years in the form of Brill-Zinsser disease.

Incubation period
1 - 2 weeks, most frequently 12 days.

Infectious period
The disease is not directly communicable from man to man. The patient is infectious for lice during the disease febrile phase and 2 - 3 days after the elevated body temperature returns to normal. The infected lice excrete rickettsiae 2 - 6 days after their feeding but they are infectious much sooner (at a mechanical crush) till the time of decay, which usually lasts for 2 weeks. **Rickettsiae may survive in decayed lice for a period of several weeks**.

Incidence
The disease occurs in people with lice and under poor hygienic conditions. Incidence is usually connected with wars and famines. The disease occurred in our country during WW2 – it was epidemic in the Terezín **concentration camp.**

Therapy principles
Chloramphenicol and antibiotics of the tetracycline series at an adequate dosage are used for treatment until the elevated body temperature fully clears. A supportive therapy is analogous with typhoid fever.

Preventive measures
- In case of a stay in an endemic region it is possible to use prophylactically orally administered chloramphenicol for a period of 5 days; vacxcination is not performed.
- Spraying the clothes of risk persons with effective insecticides.

Measures at occurrence
- Obligatory notification (including the WHO).
- Isolation and treatment.
- **Delousing of persons is carried out in the infection focus, including an effective disinfection of clothing, bed-clothes, etc.**
- Medical surveillance after disinsection in foci for a period of 15 days.

EPIDEMIOLOGY OF MALARIA

Clinical features and diagnosis
The clinical symptomatology relates to the erythrocytic forms of the parasite. **Fever, anemia and splenomegaly** are dominant symptoms. A typical malarial paroxysm has three stages: an **attack of chills, a febrile phase, and pyretolysis with profuse sweating.**
The most serious form is caused by P.falciparum (tropical malaria or malignant tertian malaria); icterus, impairment of coagulation, insufficiency of the liver and kidneys, and coma may occur. The paroxysms recur every third day. In this form **local obstructions of the capillaries occur** with severe sequelae of the organ arrosion. The case-fatality rate approaches 10 % in non-treated persons. Other plasmodiae cause a less severe course and usually they don´t threaten the life of the sick. Plasmodium vivax causes benign tertian malaria. P.malariae induces quartan malaria, and P.ovale causes benign tertian malaria. Afffections usually have an uncharacteristic onset with a slowly elevating temperature even for several days.Then a chill and shivering follow

which terminate in a profuse sweating stage. The disease relapse may occur after 5 years and even longer. In endemic regions combined infections also occur.
Diagnosis is based on microscopical identification of the causative agents in thick smears stained with Giemsa. It is necessary to repeat the identification - alternation of growth stages. It is also possible to use indirect fluorescence methods and DNA hybridization.

Agent
- plasmodium vivax
- P. malariae
- P. falciparum
- P. ovale

Source - reservoir
Man is the source (who has gametocytes in his blood **-a significant reservoir of malaria**). Monkeys are infected by other species of plasmodiae; man rarely infects.

Route of transmission
The disease is transmitted from man to man by the plasmodiae of an infected **female mosquito of the genus Anopheles** during the evening and night. When the blood is sucked **male and female gematocytes penetrate** in the mosquito in whose digestive tract a sexual stage of the life cycle progresses - **sporogeny**. Sporozoites collect in the salivary glands of females and are inoculated in the blood of man at subsequent sucking. Malaria may also be transmitted by **transfusion of infected blood, contaminated needles and syringes**.

Susceptibility
General (except in persons with diverse genetic features). Tolerance is higher in endemic regions due to repeated incidence of malaria infection.

Incubation period
The time from **P. falciparum** inoculation by the mosquito till the first clinical symptoms manifestation ranges from 7 to 14 days. In P. vivax and P. ovale it is 8 - 14 days, and in P. malariae 7 - 30 days. In some strains of P. vivax and P. ovale there may be a protracted incubation of 8 to 10 months. Administration of antimalarics in insufficient doses may result in an extension of the incubation period.

Infectious period
Man is infectious for the time plasmodiae is present in the bloodstream. In cases of insufficient treatment of malaria the patients may be long-term sources of infection: **in P.malaria for 3 years and longer; in P. vivax for 1 - 2 years; and in P. falciparum within one year.** Malaria usually survives for 1 month in blood derivates.

Incidence
Malaria incidence in mild climatic zones is suppressed at present. Malaria remains the most serious medical problem in tropical and subtropical regions - South America, South-East Asia, and in some regions of the Sub-Sahara. In the Czech Republic **isolated imported cases have occurred (tens of cases)**. Importation from Southern and Central Africa, East Asia and the Near East is involved.

Therapy principles
Early administration of antimalarics - quinone, chlorquinone, aminoquinolones. Symptomatic treatment of complications. Therapeutical antimalarical agents act on the blood schizonts which have schizontocidal or **erythroschizotropic** effects.

Preventive measures
An appropriate chemoprophylaxis should start 1 week before departure to the endemic region. Then it continues in the place of abode and for 4 - 6 weeks after the return - **mefloquine, chloroquine, doxycycline.** It is necessary to pay attention to the side-effects of antimalarics. The epidemiological departments of hygienic stations provide tropical information - application of repellents in the evenings and at night, sleeping under a mosquito-net, use of insecticide aerosols in living spaces.

Measures at occurrence
- Disease notification and early treatment.
- Isolation and quarantine are not necessary in our conditions.

EPIDEMIOLOGY OF ANTHROPOZOONOSES
GENERAL REVIEW

With the anthropozoonoses group we class infections caused by agents with a long-term adaptation to animals. Latent and lethal infections are induced in them, which results in decay - epizootics. The level of biological resistance of individual biological species varies. Man is an incidental member in the circulation and preservation of the infection in the endemic region. A view is handed down that the adaptation of man to zoopathogenic agents occurred relatively late. Individual defences of the human macroorganism are related to that fact.
A number of causative agents from the anthropozoonoses group induce serious infectious diseases with protracted and degenerative alterations and a poor prognosis.
An ill animal or the pathogenic carrier is the source of infection. Man is eligible as a source of infection only exceptionally (listeriosis, pneumonic plague). All the known mechanisms of transmission apply in the spread of anthropozoonoses. **Non - transmissive infections with natural foci** belong to a special group of anthropozoonoses. L**yssa and leptospirosis** class especially with that group.

Anthrax
The etiologic agent of infection is the sporulebearing rod **Bacillus anthracis**. Mainly cattle and sheep are the reservoirs of infection. In humans it mostly concerns a professional infection: during treatment of hides and skins, wool, in veterinary surgeons, furriers, and rag-and-bone men/women (pneumonic form)
The disease occurs in three forms - **cutaneous, pulmonary, and intestinal**. The cutaneous lesion usually occurs most commonly, manifests on the hands and has a good prognosis. The anatomical basis is a pustule which fills with hemorrhagic content - **pustula maligna**. The susceptibility of man to infection is higher than in herbivora. From the preventive measures in animals **acute immunization applies**. Perfect conditions of work must be ensured and dust nuisance reduced to a minimum in hide, skin, wool, and hair processing workshops.

Glanders
The causative agent of glanders (malleus) is **Burkholderia mallei** which induces illness in horses but also in sheep, goats, cats, dogs and monkeys. The infection may be transmitted to humans. The bacterium is highly invasive and adapted to natural hosts - perissodactylates. Infection in man occurs by inhalation and contamination of skin abrasions and cuts. Manifestation is usually acute with a lethal end. The mortality rate is about 10 %; in untreated cases up to about 90 %.
Diagnosis is based on cultivation demonstration, KFR, and indirect hemagglutination.

Listeriosis
It is anthropozoonosis which proceeds under varying clinical pictures:
Adnate form - presents as meningoencephalitis or septic shock.
Acquired form - occurs in adults, causes miscarriages in pregnant women. The acquired listeriosis proceeds as a latent infection such as tonsillitis, or conjunctivitis with swelling of the lymph nodes.
Listeria monocytogenes is the causative agent of infection. Domestic and free-range animals are reservoirs of infection. Listeria carriage is accompanied by long-lasting excretion through stools and subsequent survival in soil, water, and fodder crops. The disease mostly occurs sporadically; about 30 % of all cases are diagnosed in newborns.
Infection occurs in an alimentary way. **Contaminated milk products and thermally unprocessed vegetables, etc.,** serve as the vehicle. The incubation period is short (usually about 3 weeks). Isolation of the agent from the blood, cerebrospinal fluid, placenta, etc., serves in establishing diagnosis of listeriosis (serological identifications are unreliable). Ampicillin is used for treatment. **Epidemiological measures:** to provide perfect animal origin foodmaking, its thermal processing and microbiological control (cheese cure); to liquidate perished and destroyed animal cadavers safely; disease notification (isolation is not necessary).

Plague
Plague is an acute, highly contagious disease which proceeds in a bubonic form, less frequently in a pneumonic, and rarely in a septicemic form,
The bubonic form develops after Y.pestis inoculation by an infected flea in blood-sucking. The disease has an abrupt onset with high fevers, headache, and melalgia. After several days **plague bubons** appear - swollen lymph glands. The nodes are stiff, aching, and after several days they colliquate and find a vent.

Pneumonic form – it proceeds as peracute pneumonia with acute dyspnoea, cough and bloody sputum at a minimum physical finding and a high fatality rate.
Septicemic form – has **a peracute course and a 100 % death rate.**
Laboratory diagnosis is based on **cultural examination** – the contents of the pustules, bubon punctate, from the blood, in pneumonia from the sputum. Extreme caution should be used in sampling and handling the material.
Yersinia pestis is the cause of plague. It is highly resistant in the environment, in cadavers it survives for some months. The surface protein complex F1 is a **protective antigen**. Virulent strains are facultatively intracellular parasites. Plague spreads both epidemically and pandemically. Its incidence is limited at present to **endemic regions** - as an infection with natural foci. It mainly affects steppes (prairies) and woodlands in both the tropics and colder zones.
Rodents are mainly the **reservoirs of infection**. Man applies as a source of infection in the pneumonic form.
Transmission of the plague is mediated by various species of fleas who apply as the vector of infection in animals, but also from animals to man and among humans. Epidemiologically, the chief vector is the flea of the **Xenopsylla genus, X.cheopsis species** which parasitizes on rats and easily transmits to humans during a mass death of animals. The Yersiniae multiply in the proventriculus of fleas and inoculate into the lesion after the sting. An airborne route may apply during contact with the pneumonic plague sick or in the handling of animal cadavers.

Susceptibility is general. The incubation period is most frequently 2 - 4 days; in the pneumonic form 1 - 3 days. Fleas remain infectious for several months. Bubonic plague is usually not transmitted from man to man. Plague as a transmissive anthropozoonosis with natural foci occurs most commonly in South-East Asia, Central Asia, and South-West Africa. Chloramphenicol, aminoglycoside antibiotics, and quinolones can be used for treatment. In endemic regions it is possible to administer prophylactically streptomycin, tetracycline or chloramphenicol.

Epidemiological measures
For vaccination, a killed vaccine with a protective antigen is used which confers short-term immunity. A live vaccine is also used. In endemic regions effective insecticides, repellents and rodent control are used preventively.
Repressive measures: immediate strict isolation in the infection ward, perfect disinfestation, effective continuous disinfection. The plague incidence is notifiable to the WHO.

EPIDEMIOLOGY OF TOXOPLASMOSIS

Clinical forms of toxoplasmosis

- **Acquired toxoplasmosis in immunocompetent persons**

Most infections acquired after birth are little noticed. Lymphadenopathy develops in the manifest course; in most cases it is in the cervical or retro - auricular nodes. A generalized lymphadenopathy and splenomegaly occur sporadically. General symptoms are uncharacteristic. Sporadically, damage to organs occurs with varying clinical manifestations (heart, lungs, liver, etc.).

- **Acquired toxoplasmosis in immunodefficient persons**

In most cases it concerns reactivation of a latent infection. The most frequent incidence is observed in AIDS patients, in patients with malignant tumors, and after transplantation of organs. The clinical picture is very varied.

- **Congenital (secondary) toxoplasmosis**

Congenital toxoplasmosis is a sequela infection acquired from the mother prior to or during the course of pregnancy. In most cases they proceed inapparently. The extent of damage to the fetus depends on the time of infection. In infection in the late phase of pregnancy the clinical manifestations are minimal - only with a positive serology. Toxoplasma gondii cysts survive in the brain, retina or skeletal muscles. The disease manifestation may occur from age 20 - 30 (chorioretinitis). In infection in the early phase of pregnancy (by a large infectious dose) severe sequelae appear - **miscarriage or precocious childbirth, development of hydrocephalus , calcification in the brain, etc.**
Diagnosis of toxoplasmosis is confirmed by a serological demonstration of antibodies in the ELISA test, less frequently by a lymph-node examination.

Agent
Toxoplasma gondii. The protozoa are parasitizing intracellulary. The life cycle is characterized by a change of intermediate and definitive hosts.
Sporozoites are included in the oocytes excreted by cats. They are the sexual stage of the parasite proliferating in the small intestine. After leaving the intestine a process of sporulation proceeds (2 to 3 days) which results in

infectious sporozoites. Outside the host organism, i.e. in cultural media or water, the **T.gondii oocytes survive long-term.**
Tachyzoites - are vegetative parasite forms with a rapid proliferation. They invade all human cells, except for erythrocytes. **They produce tissue cysts with bradyzoites.** Bradyzoites occur in the skeletal muscle diaphragm, and in the myocardium. The cysts are resistant - they survive the action of digestive enzymes.

Source
Warm - blooded vertebrates are the reservoirs. The definite hosts are felines - **especially the domestic cat (a sexual stage course).** Various animals are intermediate hosts: sheep, rabbits, horned cattle, pigs, rodents, birds, etc. Infectious cysts are present in the brain muscles.

Route of transmission
The infection occurs by the ingestion of infectious oocysts. Most commonly children are infected when they come into contact with cats´ feces. Adults are infected by ingestion of inadequately cooked or underdone meat products or by the milk of infected animals.
Transplacental transmission occurs in pregnant women in whose blood tachyzoites are present.

Susceptibility
General. Most infections proceed asymptomatically.

Incubation period
It ranges from 5 to 23 days.

Infectious period
Not transmissible from man to man.

Incidence
The disease incidence is global. In our country there is a positive detection of antibodies in approximately 40 % of persons over 40 years of age. In 1998 the incidence rate in the Czech Republic reached 7.8 per 100,000 inhabitants.

Therapy principles
A combination of pyrimethamine with sulfadiazine and folic acid, or of klinamycine with folic acid is used for treatment.

Preventive measures
- **Prevention of infection by oocysts from cats,** and a careful washing of fruits and vegetables prior to their consumption, to prevent contamination of objects by cats´ feces. Cats should not be fed with raw meat.
- Sufficient thermal treatment of meat products, careful hygiene in meat handling.
- To avoid drinking non-pasteurized milk; not to use raw eggs.
- Prevention of congenital infection:
  Serological examination of women of fertile age who are at risk. Treatment of acute infection in pregnancy reduces the risk of T.gondii transmission to the fetus.

Measures at occurrence
Obligatory notification.

EPIDEMIOLOGY OF TULAREMIA

Clinical features and diagnosis
The disease is characterized by several different forms according to the manner of infection:
The pulmonary form usually affects agricultural workers . The infection occurs by an aerogenic route during the processing of straw or hay contaminated with Francisella tularensis.
Landular and ulceroglandular form - characteristic are suppurative lesions at the site of entry through the skin with affection of the regional nodes.
Oculoglandular form - at penetration of the infection through the conjunctiva a sizeable secretion up to involvement of the cornea and regional lymph nodes occurs.

Oropharyngeal form - after ingestion of contaminated food or water.
Typhoidal form – a febrile illness with lymphadenopathy (toxic syndrome), often with pneumonia. Part of the affection proceeds as a combined form.
Diagnosis is based on the epidemiological history, clinical picture and serological examination. Less frequently it is based on cultural examination from a primary lesion, sputum or the lymph nodes. The agglutination reaction is used in the practical diagnosis.

Agent
The etiological agent is **Francisella tularensis**, first isolated by E.Francis in California.
Type A dominates in North America; the strains are more virulent than in Europe.
Type B occurs in rodents, birds and ticks. It is resistant to the environment, survives long-term in cadavers, and occurs in Europe.

Source
Tularemia is zoonosis. The infection may have a transmissive character (transmission from rodents by ticks or gad-flies). In the Czech Republic about 121 natural foci are known - especially in South Moravia and South Bohemia.

Route of transmission
- Through direct inoculation of the skin, conjunction cavity, and the nasopharyngeal mucosa by blood in handling infected animals.
- Handling or ingestion of undercooked infected meat.
- Ingestion of contaminated water.
- Inhalation of contaminated dust.
- By tick feeding or the tick humor, or by a hematophagic insect.

Susceptibility
General. Immunity is conferred after recovery from the illness. Reinfections are possible.

Incubation period
It is usually 3 to 5 days according to the virulence of the strain and the infectious dose.

Infectious period
Tularemia is not transmitted from man to man. Ticks are infectious for their entire life (2 - 3 years); other blood sucking insects for 14 days. Tularemia pathogens survive long-term at low temperatures in the environment.

Incidence
The disease occurs in our country throughout the year with a maximum during the winter months. In 1995 an incidence rate of 0.8 per 100,000 inhabitants was reported. 222 cases were diagnosed in 1998. The disease often has a professional character of infection.

Therapy principles
Aminoglycoside preparations for 7 - 14 days apply in tularemia treatment. It is possible to use tetracyclines.

Preventive measures
- Health education of the population to prevent potential infections; use of preventive measures in handling dead and bagged animals.
- Sufficient cooking of meat products from rabbits; not to drink water from unknown water supplies in localities where the enzootic of wild has animals occurred.
- It is necessary to use preventive measures in endemic localities when handling hay and litter.
- A live vaccine may be used (endemic foci, laboratory personnel).

Measures at occurrence
- Notification
- Treatment of the sick at an infection ward.

EPIDEMIOLOGY OF BRUCELLOSIS

Clinical features and diagnosis
The clinical course of brucellosis is very varied. In Central Europe **Bang´s disease has occurred** in cattle and pigs. Brucella is a typical animal and human parasite which very quickly penetrates tissues of the lymphatic system, mamma, genitals, respiratory and intestinal tract. Brucellosis primarily affects farm animals and is transmissible to man (largely job-related) – a **disease of a professional character.** It occurs in two forms in humans:

A) **Sporadic brucellosis** (febris undulans Bang), the etiological agent B.abortus and the type febris undulans Traum, the agent B.suis.
B) Endemic brucellosis (febris undulans Bruce), the agent B.melitensis.

The disease exhibits relapsing fever, headache, general weakness. Shivering, and profuse sweating appear, and body weight decreases. Localized infections affect the liver and spleen. A part of the disease proceeds subclinically or as a chronic localized infection (in an insufficient therapy). Osteoarticular complications are frequent (20 - 60 %) and involvement of the testicles in men with abnormalities in the spermiogramme and inflammations of adnexa in women.
Diagnosis is based on the epidemiological history, the clinical picture, and identification of IgM and, later on, IgG antibodies. **A test with the a whole blood stain** is an important screening test, as is the surface fixation test - bonding the coloured Brucella corpuscular antigen with an antibody on filtration paper.

Agent
B. melitensis - a pathogen for sheep and goats; **B.abortus** – a pathogen for cattle which causes abortion; **B.suis** - affects swine, rabbits and other animals; **B.ovis** and **B.canis** - pathogenic to sheep and dogs. The Brucellae contain two surface heat-stable antigens.

Source - reservoir
Farm animals: pigs, goats, sheep, cattle.

Route of transmission
By **direct contact** with tissues, blood urine and the placental secreta of infected animals. **By the ingestion of unpasteurized milk** and its products (cheeses). **Aerogenic transmission** of the infection in the laboratory and when handling infected cadavers is also possible.

Susceptibility
General. The disease is not transmissible from man to man.

Incubation period
It is difficult to determine, usually 5 - 60 days.

Incidence
The disease occurs all over the world; in Europe it occurs in the Mediterranean region.

Therapy principles
Antibiotics of the tetracycline series apply in the treatment of brucellosis (Malta fever) or alternatively, cotrimoxazole or fluoroquinolones may be used.

Preventive measures
- Emphasis on the pasteurization of milk and its products.
- In endemic regions, to emphasize the protection of people handling ill animals. Use of preventive vaccination in animals (including game) and use of serological and screening tests.

Measures at occurrence
- Notification and isolation of the sick.
- Continuous disinfection.
- Epidemiological search for contacts and the reservoir of infection (vehicle - milk and its products).

ANTHROPOZOONOSES INDUCED BY VIRUSES

Lyssa - (see separate chapter)

Lymphocytic choriomeningitis
An illness of mice transmissible to man. It manifests as aseptic meningitis with the symptomatology of influenza. Mice and domestic animals are the reservoirs. Transmission of the virus occurs by contaminated food and dust. Diagnosis is based on isolation of the virus and serological examination.

ANTHROPOZOONOSES INDUCED BY CHLAMYDIA

Parrot disease - Psittacosis - (see separate chapter)

Ornithosis - see separate chapter
The casual agent classes in the group of chlamydia which is quite resistant in the environment. It causes illness in birds which is transmissible to man. After exposure there exhibits an acute febrile illness or even pneumonia.

EPIDEMIOLOGY OF RABIES

Clinical features and diagnosis
The disease is caused by the rhabdovirus which circulates among animals in nature. In humans the disease occurs in our country after a bite or injury from a dog, cat, fox or other animals who excrete the virus in saliva. **Acute encephalomyelitis** always terminates with death. In an initial phase, after a prodromal stage of 2 to 4 days, there manifest fever, general fatigue and nausea. The patients report at the site bite pain and paresthesia. Changes in behaviour are present.
Then a stage of paresis and paralysis develops, leading to difficulty in swallowing, convulsions of swallowing and the laryngeal muscles, up to **hydrophobia**. The sick die in a convulsive state within 2 to 6 days of developing the disease (fully conscious -paralysis of the breathing muscles).
Diagnosis is established on the basis of personal history and laboratory examination - **direct immunofluorescent examination of the cerebral tissue of the animal or dead person.** A neutralization test on mice and tissue cultures is used in the serological diagnosis.

Agent
The rabies virus belongs to the **rhabdovirus family**, the Lyssavirus genus. The virus exists in a series of variants of wild and laboratory strains which it is possible to detect using monoclonal antibodies (diverse nucleocapsids and surface antigens). Antibodies against surface glycoproteins have protective significance and cross-react with all strains of rhabdoviruses. **Vaccines of various types are therefore effective against all variants of wild viruses.**

Source
The fox is the reservoir animal in our country. The rabies virus has also been isolated from small mice-like rodents. The infection transmits from the reservoir animal to other wild and domestic animals. It induces a lethal disease in most hosts. Canines, feline beasts, martens, bats, and primates are the natural reservoirs. One animal species is usually the reservoir in each geographic locality.

Route of transmission
By scratch, bite or contamination of the injured skin with the saliva of an ill animal excreting the virus. Transmission from man to man has not been recorded. An exception is transmission by a corneal transplant from a dead man of a dormant form of rabies.

Susceptibility
It is general in man and all warm-blooded mammals.

Incubation period
Usually 3 - 8 weeks, rarely is it shorter than 9 days. It depends on the extent and localization of the injury and on the strain of the inoculated virus.

Infectious period

The virus in dogs and cats is detected on day 3 to day 7 before the onset of clinical symptoms and during the course of the illness. In some animals (skunks) excretion of the virus was detected 18 days prior to the clinical symptoms.

Incidence
Global prevalence. It is estimated that in developing countries 35,000 to 40,000 persons die yearly. The last death in our country was recorded in 1968. It is possible to define 5 basic biotypes of rabies in Europe that are related to the individual vector species of animals.
Silvatic (forest type of infection) - foxes are the source and reservoir.
Urban type – the foci of domestic carnivora rabies relate to localities with a high incidence of fox rabies . A marked growth of rabies incidence in wild and domestic animals occurred in the 1970s with a peak in 1984 (2,232 positive cases, 86 of them in domestic carnivora). After the introduction of an oral vaccination of foxes in 1989, a marked decrease of incidence occurred (in 1994 - 221 positive findings, 191 in foxes).

Therapy principles
Administration of a vaccine with hyperimmune globulin.

Preventive measures
- Health education of the population.
- Preventive vaccination of persons at high risk (sanitation facilities, laboratory workers, etc.).
- Obligatory active immunization of dogs (recommended for cats) and targeted immunization of cattle and sheep according to the epidemiological situation.
- Active immunization of foxes by an oral vaccine.
- Monitoring of lyssa incidence in animals.

Measures at occurrence
- Destruction of dogs and cats in the focus of rabies incidence.
- Upon injury by any animal - a careful local dressing of the wound and administration of tetanal anatzoxin. In case of a **known animal** it is necessary to provide a veterinary examination repeated after 5 days. In case of a positive clinical finding in the animal, to start passively active immunization of the injured person at an antirabies centre. In case of an unknown animal, passively active immunization starts immediately.
- In case of killed and dead animals, laboratory examination of the brain decides the immunization of persons.

Active immunization
a) Pre-exposure vaccination - prophylaxis
b) Postexposure vaccination - therapy
Postexposure vaccination is carried out in persons bitten by a suspect animal which has escaped and is not at disposal for further follow-up; later on, in cases when rabies symptoms occur in the animal within a 10-day observation period following the bite. Vaccine: Imovax Rabies Vero (Pasteur Merieux, France). It is killed, lyophilized, prepared on tissue cultures.
Pre-exposure prophylaxis
a) Two doses in a 1-month interval, the booster after 1 year
b) Three doses on days 0, 7, 21 (or 28).
c) Three doses on days 0, 28, 56.

Postexposure prophylaxis
6 doses on days 0, 3, 7, 15, 30, and 90.
The vaccine is administered in the amount of 0.5 ml intramuscularly into the deltoid muscle. The booster injections are after 2 to 3 years. The **onset of a protective effect is 2 weeks after** administration of at least 2 doses; 100 % seroconversion is reached after 30 days. There is no contraindication for the postexposure administration.
Passive immunization
On the day of vaccination it is possible simultaneously to administer antirabid serum, but to a site other than where the vaccine is administered to. **Serum Antirabicum 1000 IU Pasteur inj.** is administered fractionally s.c. or i.m. in the amount of 40 IU/kg of body weight.
- Notification of all cases of injury by an animal which is suspected of infection.

EPIDEMIOLOGY OF LEPTOSPIROSES

Clinical features and diagnosis
Leptospiroses are original animal infections transmissible to man. It is an acute infectious illness which manifests by influenzal, meningeal, and bleeding symptoms. Alteration of the liver and kidneys develops. There is a 2-phase temperature curve. In the first phase headache, back-ache, and melalgia occur,in the second phase there manifest meningeal symptoms or possibly jaundice and nephritis.
Anicteric forms

- **Septicemic stage**: headache, myalgia, and bleeding into the conjunctions. Leptospiremia with manifestations of endotoxin impairment is characteristic for that stage.
- **Immune stage**: after a 1 to 3-day symptom - free period, headaches recur and there is vomiting with manifestations of meningeal irritation.
- **Leptospiroses** - in which a non-constant icterus appears, L.grippotyphosa mainly induces serous meningitis.

Icteric forms - represented by Weil´s disease (L.icterohaemorrhagiae).
A serious form of leptospirosis characterized by a septic state with high fever, shivering and disturbances of consciousness. In the first week it is possible to demonstrate proteinuria and hematuria. Involvement of the kidneys results in oliguria up to anuria. The disease lasts for several days or weeks; in untreated cases several months. The case-fatality rate is low, increasing with age.It may reach from 5 to 20 % - hepatorenal insufficiency.
Diagnosis is based on the epidemiological history, positive demonstration of leptospires in the blood and liquor within the first 10 days, later on also in urine. Further on, there is detection of specific IgM antibodies in the ELISA test.

Agent
Leptospires of the **genus Leptospiraceae, of the species Leptospira interrogans** are the causative agents. More than 200 serotypes are known, classified into 23 serogroups. In the Czech Republic **L.grippotyphosa (70 %), L.icterohaemorrhagiae (20 %), and L.sejroe (10 %)** normally occur**.** The surface polysaccharide antigen is type-specific; the somatic antigen is species-specific. The antigenic outer membranes of the leptospires are the target of a bactericidal reaction of the antibodies and complements. Among the **factors of pathogenicity** belong these toxins: undialyzable hemolysin, cell-wall lipopolysaccharide complex, phospholipases and lipases.

Source
The source and reservoir of infection are infected animals- **rats, sewer-rats, and mice-like rodents** who excrete leptospires in urine. Dogs, pigs and water-voles are potential reservoirs. Leptospires survive long-term in the kidneys and are excreted in urine.

Route of transmission
By the contact of abraded skin and mucosa with contaminated water, soil. By bathing in stagnant waters contaminated by the urine of rodents.
Ingestion - by the ingestion of untreated water from unknown sources and wells.
Inhalation of aerosols, contaminated fluids or dust.

Susceptibility
General. A type-specific immunity.

Incubation period
Usually 10 days, but ranges from 4 to 19 days.

Infectious period
Direct transmission from man to man is rare, though he excretes leptospires in urine (1 to 11 months).

Incidence
Leptospiroses occur all over the world.
Professional disease - in sewage plant workers, in mining, veterinary surgeons, farmers. The disease manifests in cycles connected with the incidence of rodents. The highest morbidity rate in our country is in the age cohort 45 - 54 years with the highest incidence in the regions of South Moravia and North Moravia. 88 cases were diagnosed in 1998.

Therapy principles

Antibiotics are indicated for treatment of leptospiroses. Penicillin G in a high dosage is the drug of choice. Ampicillin may also be used. Therapy by antibiotics has an excellent effect when started within the first days of illness.

Preventive measures

- To provide drinking water supplies in recreation areas.
- Consistent rodent control of buildings and human residences, including an effective disinfection of the urine of the sick.
- To take preventive measures for workers who are at risk.

Measures at occurrence

Obligatory notification.

EPIDEMIOLOGY OF Q - FEVER

Clinical features and diagnosis

Q-fever manifests as an acute febrile disease with an abrupt onset, retrobulbar headache, malaise, and sweating. The symptomatology resembles **influenza or atypical pneumonia**. A physical finding on the lungs is not marked. In a positive roentgenogram of the chest there are localized shadows.
Alteration of the liver appears, a clinical picture of granulomatous hepatitis and chronic endocarditis develops. The case-fatality rate in untreated cases is below 1 %. Diagnosis is based on detection of specific antibodies, isolation of the agent from the blood or detection of coxiella in bioptic material using immunofluorescence.

Agent

Coxiella burneti, which is resistant in the environment, and relatively resistant to disinfectants. It has two antigenic phases. Phase 1 occurs in a natural environment, phase 2 after the growth of C.burneti on cellular cultures.

Source - reservoir

Sheep, horned cattle, goats, cats, dogs, and rodents, but also birds and ticks.
Transovarial transmission is common in ticks. It is a condition of the transmission cycle in natural foci. In infected domestic animals (sheep, cats) the infection proceeds mostly asymptomatically. A massive excretion of C.burneti (amniotic fluid, placenta) occurs during the birth of young ones.

Route of transmission

Most commonly **air-borne**, by infectious aerosol, infected dust and excreta of animals. Epidemics have been recorded in installations where the material of infected animals is processed - handling wool.
Alimentary transmission is less frequent - ingestion of milk and its products. Insect-borne transmission is insignificant in our conditions.

Susceptibility

General. After recovery from Q-fever, cellular immunity persists longer than the humoral one - probably lifelong.

Incubation period

It depends on the infectious dose, usually 2 - 3 weeks.

Infectious period

It is not possible to unambiguously exclude direct transmission from man to man.

Incidence

Incidence of Q-fever has been registered on all continents. In endemic regions it has a professional character. It affects persons dealing with animals - veterinary surgeons, workers in slaughterhouses. No foci of Q-fever have been reported in our country. The last case of the disease was registered in 1990. Incidence of Q-fever was registered in Czech Army soldiers (SFOR) serving abroad in 1997.

Therapy principles

- **Consistent veterinary control of imported animals.**

- Strict observance of safety principles at work in endemic regions and in the laboratory.
- Pasteurization, or better still reboiling of milk in endemic regions; a safe disinfection of excreta.
- An attenuated vaccine is available in the USA.

Measures at occurrence
- Disease notification.
- In the focus of infection to provide complex information about the risk of infection. An effective disinfection of the sputum, blood, and contaminated objects; a safe handling of cadavers.
- **An epidemiological search for the source and routes of infection** - contact with sheep, goats, drinking of raw milk, work in the laboratory, etc.
- National or international measures - effective import control.

EPIDEMIOLOGY OF TETANUS

Clinical features and diagnosis
It is an early infection with serious prognosis. An acute illness caused by the action of exotoxin which is produced by C.tetani. The toxin is produced under anaerobic conditions at the tissue lesion site. The disease is characterized by aching muscle spasm - primarily of the masseter and cervical muscles (**trismus**). Later on, it is characterized by generalized spasms of the skeletal musculature and disorders of the neural vegetative regulation **(opistotonus). Risus sardonicus** appears caused by spasm of the facial muscles.
The severity of the clinical manifestations depends on the amount of C.tetani toxin produced, its bond to the receptors and on the scope and localization of the injury. The course varies from discrete muscle spasms at the portal of infection entry up to a severe generalized tetanus resulting in asphyxia. The **case-fatality rate ranges from 10 to 90 %.** It is highest in children and the aged. It is influenced by the duration of the incubation period and the availability of intensive care. **Diagnosis** is based on the clinical symptoms and the anamnestic data.

Agent
Clostridium tetani – an anaerobic rod forming highly resistant spores. It is a saprophyte of the intestines of horses and cattle, but also of man. It gets into soil through feces. **The highest incidence of spores is in manured soil where they survive long-term.**

Source - reservoir
The intestinal tract of horses and other animals. It gets into soil through feces. Infection of the injured surfaces occurs at contact with earth, dust or other contaminated objects. Infection may also occur after minute, closed injuries.

Route of transmission
Contamination of the wound by C.tetani spores - by a stab, scratch, contamination of the calf-ulcers or burns. The main factor is the depth of the trauma with formation of anaerobic conditions for the propagation of clostridia.

Susceptibility
General. Newborns are protected in the first months of life by antibodies transmitted from the mother. Prevention of neonala tetanus in developing countries is bound to the immunization of fertile aged women and during pregnancy. Vaccination against tetanus in childhood and **subsequent booster injections at 10-year intervals provide a sufficient immunity.** It follows from the serological surveys, that in persons over 60 years of age who were vaccinated for the first time in national campaigns after 1974, protective antibodies don´t persist for the whole 10 years. In case of injury it is necessary, in addition to anatoxin, to administer hyperimmune tetanic gamaglobulin. The experienced disease doesn´t confer a protective immunity.

Incubation period
The most frequent incubation period is 10 - 14 days, although it ranges from 3 - 21 days. The length depends on the nature, scope and site of injury.The shorter the incubation period, the worse the prognosis.

Infectious period
Tetanus is not transmissible from man to man.

Incidence
Tetanus is found all over the world. The highest incidence is in developing countries, including **affection of newborns - the umbilical cord is the portal of entry** (over 500,000 deceased newborns yearly). Incidence of tetanus in the Czech Republic fell to a minimum (1 to 3 cases a year) due to the national vaccinations in 1974 - 1975, 1984 - 1985, and 1994 - 1995. Persons from the highest age groups are affected, more frequently women who haven´t been vaccinated.

Therapy principles
To administer as quickly as possible human tetanic hyperimmune gamaglobulin or animal globulin. A careful surgical dressing of the wound then follows.

Preventive measures
Obligatory immunization of children with four doses of the Di - Te - Pe vaccine in the first two years of life. Three doses at a one month interval , the fourth dose at 18^{th} - 20^{th} months of age. Booster injections at age 5 and 14 (in the last year of compulsory education) only by tetanic toxoid. And **then always at 10-year intervals.**

- **The basic immunization against tetanus in non-vaccinated adults** is carried out with three doses of toxoid at a one month interval.
- The basic vaccination is not performed in persons younger than 50 , whose time from the basic vaccination exceeds 10 years. Administration of one dose of toxoid is sufficient.
- Health education **concerning the due dressing of any injury and the importance of regular booster injections against tetanus at 10-year intervals.**
- In case of injury, persons at a higher risk of contracting tetanus (workers in agriculture, gardening, athletes, chauffeurs, soldiers, etc.) are vaccinated.

b) Repressive measures
Prophylaxis of tetanus at trauma and injury

Group	Anatoxin	Hyp. Globulin
Those properly vaccinated by 15 years of age	-	-
Regular vaccination. Over 15 years - within 5 years after vaccination	-	-
-over 5 years after vaccination	0.5 ml	-
Incomplete vaccination -with 1 dose 3-6 weeks before injury	0.5 ml	-
- with 2 doses 3 weeks to 10 months before injury	0.5 ml	-
Non-vaccinated and incomplete vaccination at intervals other than mentioned above	0.5 ml	dosage according to the package leaflet
Persons over 60 years of age - with a certificate of vaccination in the last 10 years	0.5 ml	-
- without a certificate	0.5 ml	dosage according to the package leaflet
Persons with immune reaction disorders, with extensive injuries of the face and prior to their invasive surgeries on GIT	0.5 ml	dosage according to the package leaflet

- Disease notification
- Proper surgical dressing and immunoprophylaxis at injury or animal bite.

EPIDEMIOLOGY OF TRACHOMA

Clinical features and diagnosis
The disease affects the outer segments of the eye. Chlamydial conjunctivitis develops. Follicular and capillary hyperplasia occur on the tarsal side of the upper eylids, often as a result of recurrent reinfection. In an inadequate therapy, pannus appears through vascularization of the cornea with formation of scars, deformation of the upper eyelid and loss of sight.

Agent
Chlamydia trachomatis, serotype A,B, Ba and C.

Source and reservoir
The sick with trachoma conjunctivitis.

Route of transmission
Direct transmission of the infection by fingers contaminated by secreta of the conjunctions and nasopharynx or by contaminated necessities. Familial incidence is very frequent. **Flies participate in transmission in the tropics.**

Susceptibility
General. Children are more frequently affected. The disease severity is in direct relation to poor hygienic conditions.

Incubation period
5 - 12 days.

Infectious period
Man is infectious for the whole time active lesions form on the outer segment of the eye, sometimes for several years. In a chronic stage at scarring, the number of excreted chlamydiae decreases and again increases with reactivation of inflammatory secretion.

Incidence
Trachoma occurs globally, especially in endemic regions of the tropics and subtropics.
Trachoma resulting in blindness is still widespread in the Middle East, North and Sub-Saharan Africa, South-East Asia, and Latin America. In our country we can find imported cases.

Therapy principles
Oral administration of tetracycline and azitromycin in the acute phase of the disease. A local treatment by tetracycline and erythromycin in adequate formulations for several months.

Preventive measures
- Training in personal hygiene, especially in children´s establishments.

Measures at occurrence
- Notification.
- Early diagnosis and treatment.
- A search for the source of infection and an active search for contacts.
- Perfect continuous disinfection of ocular and nasopharyngeal secretions, disinfection in the foci.

EPIDEMIOLOGY OF STAPHYLOCOCCAL DISEASES

Clinical features and diagnosis
Staphylococci cause a series of clinical symptoms and manifest diseases, from the formation of individual pustules on the cutaneous surface up to severe septic states resulting in death. They also induce the formation of suppurative foci - abscesses with a typical pathological manifestation. The virulence of individual strains of staphylococci varies widely. **Staphylococcus aureus**, coagulase-positive, and ferments mannitol, apply most significantly. Nowadays in the course of nosocomial infections coagulase - negative strains also apply. They cause infections in persons with intravascular catheters, genito-urinary tract infections in women, etc. The afore-mentioned staphylococcal infections have distinct clinical and epidemiological features - in newborns,

menstruating females and hospitalized patients. Therefore, the individual clinical syndromes will be present separately.

I.

Pyoderma: impetigo, furuncle, carbuncle, abscess, etc.

Early infections: the clinical picture varies from serous exudation up to extensive celulitis with massive suppuration.

Respiratory tract infections: staphylococcal pneumonia, etc.

Osteomyelitis and arthritis: S.aureus causes acute and chronic osteomyelitis and arthritis.

Clinical features

The above mentioned groups of staphylococcal infections form a separate ,the so-called **cutaneous syndrome or system affection**. Cutaneous lesions are initially discrete with a tendency to spread. Headache with dysorexia and varying fever are present. In extensive lesions, staphylococci penetrate the bloodstream. Abscesses in the lungs, osteomyelitis, sepsis, endocarditis, meningitis, and formation of brain abscesses may occur. Staphylococcal endocarditis and subsequent complications occur in intravenous drug addicts, in inserted intravenous catheters, etc. Septic states and endocarditis are often reported when coagulase - negative staphylococci are the etiological agent.

Agent

Coagulase-positive strains of **Staphylococcus aureus**. Microbiological diagnosis is based on growth properties, detection of enzymes and toxins, bacteriophage typing, susceptibility to antibiotics, etc. Most of staphylococci clinical isolates from nosocomial infections **are resistant to penicillin G or multiresistant, including resistance to methicillin.**

S.epidermidis and S.saprophyticus apply in urinary tract inflammations and other infections - see above.

Source of infection

Man, animals rarely.

Route of transmission

A preceding colonization of the nasal cavity by coagulase-positive staphylococci (20 - 30 %) participates significantly in the transmission. **Autoinfection** applies in at least one-third of infections. In transmission of the infection a role is played by direct contact with a person who is a carrier of staphylococci or the source of the suppurative lesions (transmission by hands). Aerogenic infection rarely applies.

Susceptibility

Susceptibility is highest in newborns, the aged, and in chronic diseases (e.g., diabetes, fibrosis of the lungs, chronic insufficiency of the kidneys, reduction of globulin production, chronic granulomatous and tumorous diseases). Administration of corticosteroids and antimetabolites potentiates the susceptibility to infection.

Incubation period

It is variable, usually 4 - 10 days. The infectious period lasts for the whole time of the suppurative lesions or persistent carriage.

Incidence

Incidence is general, especially where is a low standard of hygiene, and considerable overcrowding (mainly children). It occurs sporadically and epidemically.

Preventive measures

- Health education, to observe personal hygiene.

Measures at occurrence

- Notification of sporadic and epidemic cases (schools, kindergartens, summer camps, etc.). Early isolation, to exclude contact with newborns. Effective continuous disinfection and treatment. Penicillinase of the resistant penicillin and effective cephalosporins are used for therapy.
- In nosocomial occurrences, application of epidemic and regimen measures (including a repeated examination of nasal swabs in carriers and their treatment) apply.

II.

Staphylococcal diseases in maternity units

Impetigo and other dermal lesions most frequently occur in maternity units. A secondary colonization of the nasal cavity, umbilical stump and conjunction cavity develop from the primary dermal lesions. Colonization with non-pathogenic strains of staphylococci belongs to the physiological microflora and doesn´t induce disease. Impetigo develops on the sites of wet ferments and there is subsequent dissemination on the whole body. Infection is accompanied by abundant complications.
Pemphigus neonatorum, an exfoliative dermatitis (Ritter). It starts as a diffuse scarlatinoform erythema with transition to a generalized bullous desquamative dermatitis.
It occurs all over the world, especially in maternity units which are contaminated with multiresistant staphylococci strains. The **hands of medical personnel mainly apply in the transmission of the infection.**

Epidemiological measures

- To maintain strict asepsis and antisepsis and careful washing of hands by medical personnel at each contact with the newborn.
- Continuous microbiological control of the maternity units and control of the notification system for nosocomial infections.
- Use of effective antiseptic solutions and effective disinfection. A specific therapy for cutaneous lesions.
- Early isolation and treatment in nosocomial incidence. Effective application of epidemic measures, including the tactic of occupying rooms with colonized and non-colonized newborns.

III.
Toxic shock syndrome

Clinical features

Toxic shock syndrome toxin - 1
The clinical features and criteria of toxic shock syndrome are the following: a high temperature over 38.8°C, exanthema in the form of generalized erythroderma, minute petechiae, and vesiculae or bullous exanthema are present. Diarrhea, vomiting, muscle ache, falling blood pressure, CNS disorders, higher liver function test values, and an increased blood sedimentation rate also occur.

- The principle of good therapy is early administration of an effective antibiotic on the basis of the microbiological etiological diagnosis.
- **The basic approach is cultivation from the focus or hemoculture** and subsequent exact identification.

Agent
Staphylococcus aureus producing toxin TSST - 1 or some type of enterotoxin.
Streptococcus pyogenes producing pyogenic toxin A or B, induces toxic shock-like syndrome.

Source
Staphylococci and streptococci are ubiquitous. Patients with staphylococcal or streptococcal diseases or carriers are the source. The infection may also be endogenic.

Route of transmission
In the hospital environment direct and indirect, often by the personnel´s hands.

Susceptibility
Persons with an immunity defect to bacterial toxic antigens (superantigens) are more susceptible to toxic shock syndrome.

Incubation period
It depends on the production rate of a sufficient amount of toxins. The shortest reported interval is 8 hours, the longest one 2 days.

Incidence
It is a serious, life-threatening disease. It was reported as a separate unit in 1978. Toxic shock syndrome may occur as complications in staphyloccoccal and streptococcal infections. Frequent cases occur in nosocomial infections. Attention is paid to those diseases in the Czech Republic. **An active programme of surveillance has been introduced.** The case-fatality rate is high, it reaches 11 %; in a toxic shock-like syndrome 50 %.

Therapy principles
Treatment of life - threatening functions and a prompt administration of effective antibiotics are of prime importance. Oxacilin is the drug of choice in staphylococcal etiology, vancomycin is used when there is resistance. Penicillin is used when streptococci are detected.

Preventive measures
- Consistent observance of an anti-infectious regimen in surgical wards to prevent postoperative infections.
- Elimination of nasal carriage in medical personnel.
- Not to use highly absorbent vaginal tampons.

Measures at occurrence
- Disease notification and collection of biological material for the detection of etiology.

EPIDEMIOLOGY OF AIDS

Clinical features and diagnosis
Acquired Immune Deficiency Syndrome
AIDS is a serious life-threatening infectious disease which was first recognized as a separate syndrome in 1981. The syndrome represents a late clinical stage of infection by the HIV virus with damage to the immune system. The period from obtaining the infection to **full development of AIDS lasts for 1 to 10 years**. After several weeks of infection, **manifestation of acute HIV infection** occurs in nearly half of the infected. It is characterized by symptoms of influenzal illness or of the infectious mononucleosis syndrome. Leucopenia dominates in the blood count. The disease symptoms repair spontaneously. Then a **latent period** of varying length follows when the affected individuals are without complaints (asymptomatic HIV infection). Generalized lymphadenopathy develops in sporadic cases. Gradual changes in the immune system occur - a **fall in CD4 lymphocytes** which signalizes a diminution in the immune system function. With a decrease of CD4 to the value of 500 mm^3 the disease transfers to the symptomatic phase.
Symptomatic phase of HIV - is characterized by the occurrence of candidoses of various localizations, herpetic lesions and the presence of general symptoms - fever, fatigue, body weight loss, etc. Then the so-called **large opportunistic infections** gradually exhibit. Their occurrence indicates the classification of persons into e clinical category C - a **developed stage of AIDS** . Typical for that phase is the occurrence of tumors, HIV encephalitis and a general decline in body weight.
The following opportunistic infections apply most frequently: **Pneumocystis carinii, herpetic viruses, candidoses, cryptococci, Histoplasma capsulatum, mycobacteria, etc.** Toxoplasmosis, pneumocyst pneumonia and recurrent herpetic infections are relatively well managed in complex treatment nowadays. The greatest problem remains infections induced by resistant strains of M.tuberculosis.
Diagnosis of HIV/AIDS is based on demonstration of HIV- specific antibodies. To exclude false - positive findings it is necessary to verify positive results with a confirmation test in a specialized laboratory. With a negative result it is always necessary to consider the possibility of a false - negative finding, i.e. performing the examination in the period when the examined person was unable to produce antibodies after the infection (the **immunological window**). The duration of that period is usually about 3 months on average. In the diagnosis it is also possible to use direct detection of viruses in the mononuclear cells of the peripheral blood (in newborns of HIV positive mothers). The detection of nucleic acids is carried out using a polymerase chain reaction (PCR).

Agent
HIV - Human Immunodeficiency Virus is classed with the **Retroviridae family, Lentivirus genus**. HIV occurs in two types: HIV - 1 and HIV - 2. Both types have similar epidemiological features, but different serological response and geographic distribution. The HIV - 1 type dominates in Europe and in the American and Asian continents. The HIV – 2 type occurs in regions of West Africa. HIV - 1 has a series of subtypes; it is very plastic, surface glycoproteins are subject to mutations. The viral particles have size of 100 to 120 nm. They consist of a phospholipide envelope with glycoprotein spikes and a nucleoid (core). The HIV genome forms two identical RNA fibres that possess genetic information. A r**everse transcriptase**, which enables proliferation of the virus in the invaded cell, and thus induces chronic life-long persistent infection, is the most significant enzyme.
HIV viruses have a selective tropism to the cells of the lymphocytes that possess on the surface the molecule CD4 which is a specific receptor. Glycoprotein 120 bonds to that receptor. The highest concentration of CD4 molecules is in the cytoplasmic membrane of the lymphocytes of Th - helpers.

HIV - 1 and HIV - 2 are very labile. They are destroyed by lipid solvents and detergents, acidic pH, heat, and chlorine preparations. An efficacious inactivation effect in both types of viruses exhibits 1 % glutaraldehyde, 0.2 % sodium hypochlorite, and an elevated temperature (56°C for 30 minutes).

Source - reservoir
Only infected man is the source of infection, in either the sick with manifestations of AIDS or a latent infection, (ARC - AIDS-Related Complex, PGL - Persistent Generalised Lymphadenopathy) or a symptomless carrier.
Man is the only natural host of HIV - 1 and HIV - 2. It is possible to transfer the infection to the chimpanzee but it doesn´t induce either a marked immunity disorder or a manifest disease in them.
In replication of viruses in the organism, numerous mutants with new genetic ,antigenic and biological properties occur. In the last phase of AIDS, quickly multiplying mutants with a high virulence gradually dominate.

Route of transmission
Blood - borne
- By blood derivates and HIV- contaminated blood.
- Use of **contaminated** needles and syringes in drug administration.
- Sexually-transmitted, when injury of the mucosa and bleeding occur.

Sexually transmitted
- Through sperma, vaginal secreta in homo and heterosexual intercourse.

From mother to child (15 to 30 %)
- Vertical transmission - prenatally, perinatally or possibly through the mother´s milk.

Susceptibility
General. Race and sex don´t influence susceptibility to HIV infection. A case of successful treatment of AIDS has not yet been described. The number of infected Th lymphocytes in the blood circulation is initially low. The virus gradually propagates in the lymph nodes, including the tonsils and adenoid vegetations. This replication is initially controlled by the immune systém, but the variable virus escapes immunological control. Gradually there occurs a decrease of Th lymphocytes which results in a failure of self - defence and the development of AIDS. Studies have been published from which it follows that the quality of cytotoxic T-lymphocytes, or possibly other mechanisms may influence the susceptibility to HIV infection (membrane receptors).

Incubation period
It is variable. Usually it lasts for 1 to 3 months from the infection of susceptible cells to the detection of antibodies. At that time the primary illness develops. It is not possible to design as an induction period the long phase of the latent infection with minimum symptoms, which ranges from 1 to 10 years and longer.

Infectious period
It is already at the time of HIV virus penetration in the organism and its multiplication in susceptible Th lymphocytes. Individuals remain infectious for life. The epidemicity depends on the amount of excreted virus and the phase of infection which occur in the patients . The highest number of viruses are excreted in the acute phase, less in the latent period, and it progressivelly increases in the period of clinical development of AIDS.

Incidence
It occurs globally. At present it is a pandemic. About 30 million and more HIV infected persons are expected by the year 2000. The highest incidence is on the African and Asian continents at present. From the new surveys it follows that the new subtypes are predominantly spread by heterosexual intercourse. The WHO experts estimate that in 1998 the number of newly infected persons reached 5.8 million people. In the Czech Republic there were reported to 31 December, 1998 (cummulative numbers): HIV positive including AIDS - 392, HIV + AIDS - 118 persons and 75 deaths from AIDS.

Therapy principles
Treatment is based on early diagnosis, opportunistic infection therapy, and antiviral therapy. The principal is to slow down multiplication of the retroviruses and to slow down the decline in the immune system function. The aim of antiretroviral tratment is to eliminate viruses from the macroorganism of infected patients. Antiretroviral chemotherapeutics interfere with the replication cycle and with varying intensity they inhibit proliferation in the organism:
- Inhibitors of reverse transcriptase (nevirapine, delavirdine, mesylate, etc.).
- Analogs of nucleosides (lamivudine, stavudine, didanosine, etc.).
- Inhibitors of proteases (indinavir, ritonavir, etc.).

By a combination of the above mentioned preparations it is possible to a certain extent to prevent the occurrence of resistant variants of HIV. The basic drug in our country is azidothymidine (AZT).

Preventive measures

- At present no specific preventive measures are available, preparation of an effective vaccine is in the experimental phase.
- Health education promoting a responsible approach to sex - use of condoms.
- To prevent contamination of blood tins and derivates.
- Supporting the programme of taking/giving needles and syringes from/to intravenous drug addicts.

Measures at occurrence

- Notification of HIV positive persons, the sick with AIDS and deaths to the National Reference Laboratory for AIDS in Prague.
- No quarantine measures are performed, nor is there any restriction of social contacts.

EPIDEMIOLOGY OF SYPHILIS

Clinical features and diagnosis

It is an acute to chronic sexually transmitted disease. It is characterized by primary lesions, by eruption of maculopapulous exanthema in the secondary stage, a period of latency and late lesions in the tertiary stage.
Primary stage - a typical finding is chancre (ulcus durum) at the site of inoculation (external genitalia, cervix, on the anal mucosa, lips, tongue, etc.). It appears 2 to 3 weeks after the infection. It is a painless lesion, produces serous exudate and is accompanied by lymphadenitis.
Secondary stage - in one-third of untreated persons development of the secondary stage, i.e. generalization of the maculopapulous exanthema occurs after 8 to 12 weeks. It affects the skin, including palms and the soles. It clears spontaneously within several weeks.
Tertiary stage - approximately one-third of the untreated syphylis of the secondary stage transfer to a period of latency and then to the final stage. The tertiary stage is marked by formation of gummas due to a specific proliferative inflammation. It mainly affects the central nervous system (neurolues -tabes dorsalis) and the cardiovascular system (aneurysm of the aorta).
Congenital syphylis is acquired by the foetus in utero. Abortions and precocious deliveries with extensive dysgenesis occur.
Diagnosis is based on clinical manifestations, the epidemiological evidence and laboratory findings. Microscopical detection of treponemes from the primary lesions confirms the diagnosis already in the first stage of seronegative syphilis.
Serologic tests: The blood and cerebrospinal fluid are examined.

- Non-specific tests (BWR, RRR - Rapid reagin reaction) - their results are to be verified by specific tests with treponemal antigens, e.g., FTA - ABS (Fluorescent Treponemal Antibody - Absorption test).

Serologic tests in most cases are not positive in the primary stage. Positivity occurs in the 6^{th} - 8^{th} week after the infection, i.e. 10 - 20 days after the primary affect.

Agent

Treponema pallidum, primarily pathogenic to man who is the only host. It is susceptible to the environment. It is destroyed by common disinfectants. It contains antigens of a protein nature which is the cause of serologic cross - reactions (T.pertenue, T.carateum, etc.).

Source - reservoir

A sick man in the primary and secondary stage and in the first years of the latent stage. Treponemes survive in the organism even after primary lesions heal.

Route of transmission

By direct contact through infectious exudates of infected persons - most commonly through sexual intercourse (saliva, sperm, blood, vaginal secreta).
Professional disease - primary lesions on the hands of the medical personnel.
Transmission by blood transfusion - a blood donor in a seronegative stage.
Transplacental transmission or intranatal infection.

Susceptibility

General. Infection develops in approximately 30 % of exposed persons. Antibodies produced in the first stage don´t prevent formation of the secondary stage. At that stage the antibody titre rises markedly. Both stages are highly infectious. Treponemes are demonstrated in the tertiary stage exceptionally. The specific antibody and cellular immunity (IgM, IgG) develop during the course of the disease. It is partly crossed between T.pallidum and other treponemes. Immunity doesn´t develop in early treated cases of the first stage.

Incubation period
It ranges from 10 to 90 days, most frequently 3 weeks.

Infectious period
It is not exactly defined. It includes the first and second stage and the first period of latency - 4 years. Virulent strains of treponemes are covered on the surface with a marked mucous layer which inhibits phagocytosis but protects also against the effect of antibodies and complement. In the latent stage transmission applies in case of recurrences of dermal and mucosal affects which routinely pass unnoticed.

Incidence
It occurs all over the world, especially in sexually active young people. It has a social character. A significantly higher number of the reported cases are from large cities. An increase in syphilis cases was registered in the 1970s and 1980s - about 300 cases a year. At present the number of cases of latent and manifest syphilis in the Czech Republic is about 200 cases yearly. A considerable under-reporting is presumed.

Therapy principles
Penicillin is used for treatment. Erythromycin in case of allergy, doxycycline or tetracycline may also be used. A repeated serologic examination within an interval of 3 - 6 months is carried out in the course of treatment.

Preventive measures
- Health education aimed at young people.
- Active search for persons with latent syphilis , and adequate treatment.
- Serologic examination of females in the early stage of gravidity - prevention of congenital syphilis.

Measures at occurrence
- Obligatory notification, isolation and treatment of the sick.
- Epidemiological search, assessment of the source and contacts.
- To examine all family members in case of congenital syphilis in newborns.

EPIDEMIOLOGY OF SCABIES

Clinical features and diagnosis
It is a parasitic disease of the skin caused by mites.
Dominant symptoms: intense itching at night, occurrence of papulae, vesiculae, linear ductuli and scratches in various developmental stages.
Localization - sites with a fine keratotic layer (web spaces, on the genitals, on the breasts of women, on the buttocks, wrists, elbows, and in the axilla. Various bacterial infections are frequent complications of scabies - impetigo up to extensive pyoderma.
Diagnosis is based on the clinical picture, the epidemiological data and microscopical detection of the mite in the skin scraping.
Forms of scabies:
- **Scabies with minimum manifestations** - in persons with sufficient hygiene. Diagnosis is difficult, most of the itch mites are removed during washing.
- **Modular form** - it concerns the formation of nodules due to a hypersensitive reaction to itch mites. The most frequent localization is on the external genitalia of males, in inguina and axilla.
- **Scabies transmitted from animals** - most commonly from cats and dogs infected by scabies mites which may attack people but their further reproduction doesn´t occur.
- **Norwegian scabies** - a severe form of scabies usually in weakened individuals. It is clinically characterized by the formation of vesiculae and thick hyperkeratotic crusts (on the hairy parts of the head, elbows, palms, and buttocks). It causes epidemic outbreaks in refugee camps, in mental homes, etc. It is a highly infective form of scabies. In desquamating skin millions of mites survive. This type occurs in AIDS patients.

- **Scabies incognito** - characterized by minimum manifestations, it concerns forms treated by corticoids, which result in the suppression of symptoms.

Agent
Sarcoptes scabiei var. Hominis - itch mite - 0.3 x 0.4 mm, of a pinkhead size. It has a grey-white colour and 8 short legs. Female mites burrow into the superficial skin, and form corridors into which they lay eggs; mite larvae hatch after 3 - 4 days. The development of females from eggs via the larva and two nymphal stages to the mature form lasts 14 - 17 days. The **mites live for 3 - 6 weeks; outside the human body up to 6 days.**

Source - reservoir
Infested man is the source of infection.

Route of transmission
The infection spreads directly by close contact or through sexual contact. When sleeping in one bed with the infected person, exposure to a contaminated bed - clothes, linen (service coats, blankets, etc.). The infection is transmitted by fertilized female mites which at night get out of the corridors in the skin and spread all over the body. Transmission occurs most frequently in public dormitories and within the family.

Susceptibility
Significantly, predisposition factors apply: overcrowding, migration of the population, a poor standard of hygiene, weakened immunity, malnutrition, etc. A higher risk threatens weakened individuals of all age groups, and immunodeficient states as well as mental patients.

Incubation period
In a primary infection 2 - 6 weeks; in a reinfection 1 - 4 days.

Infectious period
For the whole time of infection, unless the mite eggs were destroyed by effective treatment (usually a week after the first or second medication cure).

Incidence
It occurs all over the world. At present it occurs in Europe in all socioeconomic strata of the population, regardless of sex, age, and a good standard of hygiene. **Scabies is the fourth most frequent infectious disease in the Czech Republic.** It affects all age groups, with the highest incidence in the age cohort 15 - 19 years. Incidence is registered throughout the year. In 1998 the incidence rate reached 86.2 per 100,000 inhabitants. We classify it into the group of sexually transmitted diseases.

Therapy principles
An adequate local treatment with an effective preparation for older children and adults - **scabicid lot**. For children younger than 2 , for pregnant and breast - feeding women - **crotamiton**. The preparations apply on the whole body surface, at least two procedures. Exchange of bedclothes for all family members is a matter - of - course.

Preventive measures
- Health education.
- Early diagnosis and treatment of all infested persons.

Measures at occurrence
- Obligatory notification of the sick.
- Epidemiological search in the infection focus.
- Treatment of all familial and sexual contacts for the last month.
- Boiling of all bedclothes and linen to destroy used creams and cosmetics (survival of mites).

References

- Benenson, A.S. (ed.): Control of Communicable Diseases Manual, 16th ed., Washington, American Public Health Association, 1995