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## **EPIZOOTOLOGICAL AND EPIDEMIOLOGICAL FEATURES OF LISTERIOSIS, GENERAL AND SPECIFIC PREVENTION IN ANIMALS AND HUMANS.**

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Epidemiological and epizootic surveillance of listeriosis remains an urgent problem. Listeriosis refers to diseases characterized by polymorphism of clinical manifestations, a variety of variants of the course and outcomes of the disease. The incidence of listeriosis is low, however, given the severity of clinical manifestations and high mortality in large foci (20-40%), this infection is controlled by the World Health Organization. Listeriosis has turned from diseases that are more often registered mainly among animals and less often among people in rural areas into one of the most significant food-borne zoonoanroponotic diseases in the world. It has been described the peculiarities of listeriosis, its causes in animals and humans, diagnostic methods, prevention and eradication ways.

**Keywords:** listeriosis, ethiology, epizootological and epidemiological peculiarities, zooanthroponosis, saprophytism, bacteriocarriage, liver media, virulence, diagnosis, treatment, specific and general prophylactics.

### **Relevance**

Epidemiological and epizootic surveillance of listeriosis remains an urgent problem. Listeriosis refers to diseases characterized by polymorphism of clinical manifestations, a variety of variants of the course and outcomes of the disease. The incidence of listeriosis is low, however, given the severity of clinical manifestations and high mortality in large foci (20-40%), this infection is controlled by the World Health Organization. Listeriosis has turned from diseases that are more often registered mainly among animals and less often among people in rural areas into one of the most significant food-borne zooantroponotic diseases in the world. Pathogenic listeria species (*Listeria monocytogenes* and *Listeria ivanovii*) have become traditional contaminants of food raw materials and food products, which, as transmission factors, play a leading role in the occurrence of listeriosis in humans. Ready-to-use products are particularly dangerous, since no heat treatment or other effects of antimicrobials are carried out between their production and consumption. Newborns, pregnant women, the elderly and people with weakened immune systems are particularly susceptible to listeriosis. The timely detection of *L. monocytogenes* in food products at the stages of their manufacture and storage is important both for food industry and public catering enterprises and for public health.

At the same time, it must be remembered that listeria is ubiquitous and, having broad adaptive capabilities, is able to adapt to existence in various conditions and acquire various properties that are not characteristic of them. Thus, *L. monocytogenes* is able to switch between saprophytism and virulence depending on conditions. The environment in which the pathogen is located can affect the expression of virulence genes.

**The purpose of the research:** to analyze the literature data, as well as own research on the laboratory diagnosis of listeriosis in animals and humans. The article provides data on the features of the disease, the causes of its occurrence in humans and animals, diagnostics, methods of prevention and elimination.

**Materials and methods of research.** We have studied the scientific and methodological literature on the study of epidemiological and epizootic features of listeriosis.

The causative agent of listeriosis *Listeria monocytogenes* (pathogenic to animals and humans) and *L. ivanovii*-2 (pathogenic to animals and less often to humans) belongs to the genus *Listeria*. Four other species of bacteria that are not pathogenic to humans and animals belong to this genus (*grayi* (*murrayi*), *seeligeri*, *innocua*, *welsimeri*). Representatives of this genus are short sticks of regular shape with rounded ends, measuring 0.4-0.5 x 0.5 - 2 microns. *Listeria* are arranged singly or in pairs at an angle in the form of the letter V, sometimes they have the shape of cocci, vibrios and filaments. They are gram-positive, do not form spores and capsules, are acid-resistant, have flagella in young 6-18-hour cultures and have mobility. In old cultures, they lose mobility and become gram-negative. *Listeria* has a complex antigenic structure, they have 15 somatic and 5 flagellar antigens. The pathogen grows well in aerobic conditions on conventional BCH and MPA. On media cooked in open-hearth broth and on liver media with the addition of 1% glucose and 2-3% glycerin, their growth accelerates. It is characterized by transformation into L forms and parasitizing intracellularly. This causes insufficient effectiveness of antibacterial therapy and explains the latent course of the infectious process and bacterial carrier. On the first day of the BCH, the pathogen formed a slight turbidity of the broth. In 3-5 days - a mucous precipitate, the type of pigtail is also characteristic when shaking. On dense media (MPA), *Listeria* growth is observed with the formation of delicate transparent colonies with a bluish tinge, 1-1.5 mm in diameter, resembling dew droplets (subsequently, the colonies become cloudy). The causative agent of listeriosis is morphologically and by the nature of growth on nutrient media very similar to the causative agent of porcine erysipelas. *L. monocytogenes* is capable. The environment in which the pathogen is located can affect the expression of virulence genes. And perhaps that's why *Listeria* is able to switch between saprophytism and virulence depending on environmental conditions. *Listeria* species are known to be able to exchange resistance determinants with other bacterial species by acquiring antibiotic resistance genes from plasmids of other organisms and conjugated transposons. Having broad adaptive capabilities, they are able to adapt to existence in various conditions and acquire various properties that are not characteristic of them.

Analysis of the literature data and the results of our own research show that listeriosis is registered in more than 50 countries of the world and in all CIS countries. The economic damage can be significant and

consists of the mortality of animals up to 40%, reduced productivity, abortions, as well as the cost of therapeutic and preventive measures. Because of a person's susceptibility to listeriosis, the disease has great social significance. Mortality in people with listeriosis can reach 60%, including among children under 1 month of age from 21.1% to 75.1%. *Listeria* can turn into L forms and parasitize intracellularly, which sometimes causes insufficient effectiveness of antibacterial therapy and explains the latent course of the infectious process and bacterial carrier. *Listeria* resistance is significant. They persist for a long time in the external environment: in the soil - from 1 to 4 months; in water - up to 20 months; in livestock premises - about 1 month; in oats - up to 10 months; in silage and meat and bone meal - up to 4 months. At low temperatures, *Listeria* can persist for a long time not only in soil and water, but also in silage, therefore listeriosis is considered as "saprozoonosis", and the disease is often called "silage disease". In the objects of the external environment, *Listeria* can not only persist for a long time, but also multiply. At the same time, *Listeria* grow in a wide range of temperatures (from +3 to +42 ° C) and the pH of the medium (from 5.5 to 9.5), tolerate cooling well and can multiply at +4 - +6 ° C in soil, water, on plants, in the organs of corpses. In food products (sausages, cheeses, milk, meat, etc.) they multiply at the temperature of a household refrigerator. At +70 ° C, they die in 20-30 minutes, at +100 ° C - in 3-5 minutes.; they are inactivated with solutions of formalin (0.5 - 1%), phenol (5%), bleach (2% active chlorine), sodium hydroxide (3%). The causative agents of listeriosis belong to the first group of resistance of microorganisms (low-resistant) to disinfectant chemicals. *Listeria* is sensitive to penicillins, tetracyclines, aminoglycosides, resistant to cephalosporins. New generation fluoroquinolones have antibacterial activity against *L. monocytogenes*. All types of domestic animals are susceptible to listeriosis (sheep are more often sick, cattle, pigs, horses are less common) and many types of wild animals, rodents, domestic (chickens, geese, ducks) and wild poultry. Young and pregnant animals are the most susceptible. Piglets in most cases get sick in the weaning period, calves aged from 2 days to 12 months, lambs - at 3-6 months of age. Foals and adult horses get sick at the age of 3 months to 5 years. Wolves, foxes, squirrels, hares, minks, arctic foxes, wild pigs, hedgehogs (about 92 species in total) are susceptible from wild animals. From laboratory animals, white mice, rabbits and guinea pigs are susceptible. In humans, pregnant women, newborns (in the first three weeks of life), adults older than 45-50 years of age, as well as persons with defects in the immune system and microbial

ecology of the digestive tract are susceptible to listeriosis. Occupational disease is considered for workers of livestock and poultry farms and complexes, workshops of primary processing of livestock products at meat and poultry processing plants, veterinary specialists and slaughterhouse workers. The source of the causative agent of infection are sick animals that secrete the pathogen into the external environment with effusions from the nasal cavity, genitals (during abortions), with feces, urine, milk (with listeria mastitis), as well as listeria-bearing animals. In animals in farms that are disadvantaged by this disease, listeria production can reach 21%, and up to 9% of them can be listeria separators. Listeria-bearing can take place among healthy animals of prosperous farms. Sources of the causative agent of infection for animals can be people with listeriosis, as well as listeri carriers. The frequency of listeria carriers in humans can be 2-20%, from the feces of healthy people, listeria is isolated in 5-6% of the examined individuals. The pathogen is released from the animal body into the external environment with urine, feces, milk and effusions from the nasal cavity, eyes and genitals. Infection occurs in an alimentary way, as well as through the mucous membranes of the eyes, nasal cavity and damaged skin. Infection is possible intrauterine, aerogenic and sexually. The mechanisms of human infection are diverse. Most often, infection occurs in an alimentary way when consuming milk and dairy products, animal and poultry meat, vegetables and seafood contaminated with listeria. The technology of preparation of some products is such that there is a great danger of contamination with listeria and further reproduction of microbes to high concentrations (including when stored in the refrigerator). Currently, listeriosis is considered in medicine as a disease with a predominantly alimentary transmission pathway. There are known contact mechanisms of infection (from infected animals and rodents), aerogenic (indoors when processing hides, wool, as well as in hospitals), transmissible (with insect bites, in particular ticks), sexual. Of particular importance is the transmission of the causative agent of listeriosis from a pregnant woman to the fetus (transplacentally). Listeria can be the cause of nosocomial infection, in particular, in maternity hospitals. Transmission factors for animals are soil, water, feed, food waste, care items, etc. contaminated with the pathogen (1,2,4). Of the food products, dairy products, mainly unpasteurized or poorly pasteurized, play an important role as a transmission factor. Listeriosis in animals is recorded in the form of sporadic cases and enzootia, less often - in the form of epizootics. The mortality rate reaches 40%- 80%. Mortality in the septic form of listeriosis

in newborns, persons with severe immunodeficiency and violation of the ecology of the digestive tract, patients with cirrhosis of the liver and chronic alcoholism can reach 60%. The pathogen enters the animal body through the mucous membranes of the nasal and oral cavities, conjunctiva, digestive tract, respiratory tract and damaged skin. From the places of primary penetration, the pathogen spreads lymphogenically and hematogenically throughout the body. In pregnant animals, the pathogen penetrates the fetus, causes sepsis, death and abortion. Exo- and endotoxins play an important role in the pathogenesis of listeriosis. Under their influence, the permeability of blood vessels increases, dystrophy and inflammatory processes occur in tissues and various organs, the number of monocytes increases. An increase in the number of monocytes in the blood of animals with listeriosis is considered as a result of an active phagocytic reaction of the body or the presence of a substance stimulating monocyto- sis in the causative agent of listeriosis. According to modern ideas, listeria in the body of animals multiply mainly inside macrophages. The latter (free and fixed) play an important role in the spread and preservation of listeria in the body. Incompleteness of phagocytosis in listeriosis, prolonged preservation of phagocytes with listeria in the body of animals (up to 2 years) causes long-term listeria. A similar mechanism of the development of the infectious process occurs in listeriosis in humans. In animals, listeriosis can manifest itself in nervous, genital and septic forms, and in humans - in glandular, nervous and septic forms. In pigs, the incubation period lasts from 7 to 30 days. The disease proceeds acutely (in weaned piglets), subacute and chronically (in other age and sex groups of pigs (the stem part of the brain and the cervical part of the spinal cord). Diagnosis of listeriosis in animals is based on the consideration of epizootological data, clinical signs, pathoanatomic and pathohistological changes, as well as the results of laboratory studies. From epizootological data, the susceptibility to listeriosis of many species of domestic and wild animals, as well as humans, stationarity, natural foci, and predominant sporadicity are taken into account. Treatment for listeriosis is poorly effective. Animals with listeriosis with signs of damage to the central nervous system are sent for slaughter. Antibiotic therapy also takes place in the treatment of people with listeriosis. In the localized (glandular) form, one of the following drugs is used: ampicillin (amoxicillin), co-trimoxazole, erythromycin, tetracycline (doxycycline), levomycetin in medium therapeutic dosages. Specific prevention of listeriosis in humans has not been developed. In order to prevent listeriosis, it is necessary to carry out

general measures, the prohibition of the use of unpasteurized milk and insufficiently heat-treated meat is important in the prevention of listeriosis in humans. Women working in animal husbandry and planning pregnancy should be temporarily transferred to a job that does not involve constant contact with animals. Specific prevention of listeriosis in humans has not been developed.

**Conclusion.** Thus, listeriosis is a natural focal zoonotic infectious disease in animals, occurring with signs of damage to the central nervous system, sepsis phenomena, abortions and mastitis. In humans, the disease is manifested by polymorphism of clinical signs, damage to almost all organs, systems and tissues of the body, a significant effect on the neuroimmunoendocrine system and high mortality in newborns, people with immunodeficiency, violation of the ecology of the digestive tract, patients with cirrhosis of the liver and alcoholism. In animals and humans, the disease can occur in the form of an asymptomatic carrier. Mortality in animals with listeriosis reaches 40%, and in humans - 60%, including among children under 1 month of age - from 21.1 to 75.1%. An important role in the prevention of listeriosis in humans is assigned to the prevention of this disease in animals.

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