



ZOONOTIC DISEASES IN ANIMALS: DIAGNOSIS, LABORATORY TESTING, AND BIOLOGICAL SAFETY

Muratbaeva Biybimaryam Jalgasbay qizi -Nukus branch of Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnologies, assistant teacher
Bazarbaeva Bibinur Perdebay qizi - Nukus branch of Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnologies, student

Abstract: *Zoonotic diseases are infections that can be transmitted between animals and humans, posing significant risks to public health. Early diagnosis and accurate laboratory testing are essential for controlling these diseases in animals. This article highlights key diagnostic methods, including serological tests and molecular techniques such as PCR. It also emphasizes the importance of biosafety practices in veterinary laboratories to prevent pathogen spread. The One Health approach is discussed as a comprehensive strategy for managing zoonotic threats.*

Keywords: *zoonotic diseases, biosafety measures, laboratory testing, pathogen detection, One Health, public health, emerging infectious diseases, molecular diagnostics, animal health, diagnostic techniques, zoonotic pathogens, biological safety, disease transmission, risk assessment*

Zoonotic diseases (zoonoses) are infections that can be naturally transmitted from vertebrate animals to humans. These diseases are of global concern because they affect both public and animal health, cause significant economic losses, and can lead to pandemics, as seen with COVID-19 (suspected to have originated from animals). The increasing contact between humans and animals due to urbanization, deforestation, global trade, and climate change contributes to the spread of zoonoses. Examples of zoonoses include rabies, anthrax, Q fever, avian influenza, leptospirosis, and brucellosis. With the development of the One Health initiative, the focus has shifted toward multidisciplinary collaboration to control these diseases. The article explores the principles of zoonotic disease diagnostics, relevant

laboratory techniques, and the importance of biological safety in preventing further transmission. [2]

Types and Transmission of Zoonotic Diseases

Zoonotic diseases are caused by various pathogens including bacteria, viruses, parasites, and fungi. The main types include:

Bacterial zoonoses: Tularemia, Brucellosis, Plague (*Yersinia pestis*), Leptospirosis.

Viral zoonoses: Rabies, Hantaviruses, Ebola, Influenza viruses.

Parasitic zoonoses: Toxoplasmosis, Trichinellosis, Echinococcosis.

Fungal zoonoses: Cryptococcosis, Sporotrichosis. Transmission from animals to humans can occur through direct contact, tissue, blood, feces, or via vectors such as mosquitoes and ticks. [3]

Work Procedures and Sanitation

Sterile instruments and strict protocols are used when handling pathogens. Workspaces are regularly disinfected. Waste is disposed of using specialized methods to prevent disease spread. Veterinary and Epidemiological Control Regular examinations, vaccinations, and parasite control in animals help limit the spread of zoonotic diseases.

Anthrax - is an acute infectious disease that occurs in both humans and animals; it belongs to the group of zoonotic diseases. The disease has been known since ancient times. Hippocrates also wrote about it. The causative agent of anthrax is **Bacillus anthracis**, a stationary rod that forms spores. The spores are highly resistant and can survive in water for many years and in soil for decades (20–30 years or more). In humans, the disease is transmitted from infected animals—during slaughter, meat processing, as well as through water, soil, and livestock products. Typically, the disease is more common among workers in this field, that is, people who have direct contact with animals. Infection can enter a healthy person's body through the respiratory tract, skin, and mouth. In humans, anthrax can affect the

lungs, intestines, skin, and, in some cases, the blood, leading to septic forms. The symptoms vary depending on the affected organ. In the skin form of anthrax, the causative agent enters through damaged skin. The incubation period in this form is 2–3 days. Initially, a papule (a small bump) forms at the site of infection, which then turns into a blister filled with cloudy or bloody fluid. The blister soon bursts and forms a black scab. Around it, new blisters form, and the black scab enlarges, with a painless swelling appearing beneath it. This lesion is often referred to as a "charcoal ulcer." It usually appears on the face, hands, neck, or legs. In this case, fever, headache, weakness, insomnia, and other symptoms are observed. After 2–3 weeks, the patient starts recovering. In pulmonary anthrax, a sudden fever arises, accompanied by coughing with bloody sputum, chest pain, and difficulty breathing. Intestinal anthrax begins like food poisoning, with nausea, vomiting, severe abdominal pain, and constipation. Pulmonary and intestinal forms are very rare. For treatment, penicillin and anthrax gamma-globulin are used. For prevention, people who have contact with livestock (herders, butchers, tanners) are vaccinated against anthrax. [4]

In animals (especially horses, cattle, sheep, goats, and buffalo), anthrax occurs with septicemia, blood infiltration into the subcutaneous tissues, and other internal organs. The incubation period in animals is 1–3 days. Animals become infected through contaminated feed, water, air, and also through blood-sucking insects such as flies and ticks.

After entering the body, the pathogen passes into the blood and lymph, causing general septicemia. In the blood, shells appear around the bacteria, and they begin to produce toxins in large quantities. Rapidly multiplying microbes cause swelling in subcutaneous tissues and other organs, and the toxins increase the permeability of blood vessels, leading to blood infiltration in all internal organs and tissues. Circulation slows down. [5]

Haemonchosis – a helminth disease affecting ruminants such as sheep, goats, cattle, camels, and others, caused by nematodes of the genus *Haemonchus*, which parasitize the abomasum (true stomach). The disease commonly occurs in lambs aged six months during the spring and summer seasons, and in one-year-old sheep in late winter and early spring. The causative nematode (*Haemonchus*) parasitizes the abomasum and small intestines, laying eggs that are passed out of the host with feces. Within 24 hours, the eggs hatch into larvae, which become infective (invasive) within 4–5 days. [6] Animals become infected by ingesting these larvae along with contaminated water or forage. Infected animals show symptoms such as loss of appetite, diarrhea, and weight loss. After ingestion, the larvae shed their outer layer in the abomasum, attach to the mucosal lining, and develop into mature male and female *Haemonchus* worms. These parasites can live in the host organism for about one year before losing their parasitic capacity and being expelled with feces. Treatment: Animals infected with *Haemonchus* are treated with anthelmintics such as phenothiazine, fenbendazole, ivermectin, moxidectin, or morantel tartrate. [7]

Deinvasion (from Latin *invasio* — invasion) — the elimination and neutralization of causative agents of invasive diseases in animals (worms, some insect eggs and larvae, etc.) in the external environment. In veterinary practice, preventive deinvasion is carried out together with disinfection. Current deinvasion is performed 3–4 days after the next dehelminthization of animals. During deinvasion, it is necessary to take into account the developmental periods of parasite eggs and larvae, their maturation times in the external environment and in the animal organism, their resistance to physical and chemical effects, and other factors. Buildings and equipment are treated using chemical methods (slaked lime, 5% NaOH solution, etc.), physical methods (burning, boiling, etc.), and mechanical methods (collecting, cleaning, and neutralizing waste).

Dermatoses — a general term for diseases of the skin and its appendages (hair, nails, etc.); they may represent distinct diseases or symptoms of other systemic

conditions. Dermatoses are classified into external (exogenous) and internal (endogenous) types. External dermatoses are caused by environmental factors such as physical agents (mechanical irritants, radiation, heat or cold, etc.), chemical agents (including chemicals used industrially and domestically, medications, food additives), and biological agents (microorganisms, insects, etc.). Internal dermatoses arise due to metabolic disturbances, internal diseases—particularly gastrointestinal diseases, infections in organs such as teeth, tonsils, gallbladder, and others. Occupational and allergic dermatoses are more commonly observed. The course of the disease depends on its etiology and pathogenesis. [8]

Conclusion

Zoonotic diseases continue to threaten global health and economic stability. Rapid and accurate diagnosis is a cornerstone of effective disease control. Veterinary laboratories play a vital role in identifying zoonotic agents through serological, microbiological, and molecular techniques. However, safe handling of these agents is essential, and biosafety practices must be strictly followed. The integration of the One Health framework ensures that veterinary, medical, and environmental efforts are harmonized to prevent and respond to zoonotic disease outbreaks. Continued investment in diagnostic technologies, training, and collaborative infrastructure is crucial for managing current and emerging zoonotic threats.

References

1. Bologna, J.L., Schaffer, J.V., Cerroni, L. Dermatology. 4th Edition. Elsevier, 2018.
2. Habif, T.P. Clinical Dermatology: A Color Guide to Diagnosis and Therapy. 6th Edition. Elsevier, 2016.
3. Rook's Textbook of Dermatology. 9th Edition. Wiley-Blackwell, 2016.
4. Fitzpatrick's Dermatology in General Medicine. 9th Edition. McGraw-Hill, 2019.
5. Elias, P.M., Farber, E.M., Maibach, H.I. Skin Barrier. CRC Press, 2020.

6. James, W.D., Berger, T.G., Elston, D.M. Andrews' Diseases of the Skin: Clinical Dermatology. 13th Edition. Elsevier, 2020.
7. Parish, L.C. Occupational Dermatoses. Dermatologic Clinics, 2018.
8. Kanwar, A.J., De, D. Textbook of Dermatology, Venereology and Leprosy. CBS Publishers, 2014.