

Encephalitozoon Cuniculi and Companion Rabbits

Definition

Encephalitozoonosis is an infectious disease caused by the parasite *Encephalitozoon cuniculi*, abbreviated as *E. cuniculi* or ECUN. This parasite is classified as a microsporidia, similar to fungi. There are three strains of *E. cuniculi*, and each is classified according to the mammal species from which it was originally identified.

QUICK FACTS



- *Encephalitozoon cuniculi* is a single-celled parasite that many rabbits come in contact with but does not always cause disease.
- Typical clinical signs include head tilt, ataxia or stumbling gait, circling, and rolling.
- The organ most commonly affected by *E. cuniculi* is the brain, but some rabbits can also develop kidney disease or eye issues.
- Definitive diagnosis is not straightforward, but tests exist to support a diagnosis.
- Rabbits cannot be completely cured of *E. cuniculi*, but there are many things we can do to manage and sometimes resolve clinical signs. Commonly prescribed medications include benzimidazoles and anti-inflammatories.

Signs & Symptoms

The most commonly recognized symptoms of *E. cuniculi* are attributed to the parasite affecting the vestibular system, which controls an individual's sense of balance. Typically, signs are seen suddenly after a stressful event and will vary in severity. Some animals may have a mild head tilt and subtle imbalance issues, while others may lie on their side, unable to correct their posture without rolling. If present, rolling may be quite dramatic, sometimes being mistaken for seizures. Other signs of *E. cuniculi* may include cataracts and inflammation within the eye, repeated episodes of decreased appetite or stool production, and urinary changes or incontinence. Signs and symptoms of *E. cuniculi* may arise suddenly or develop gradually over time.

E. cuniculi is widespread in rabbits. Most rabbits will never develop symptoms, and others may be infected for years before symptoms develop. There is no way to predict whether an infected rabbit will develop symptoms in the future.

Classic clinical signs include:

- Head tilt
- Rapid eye movements side to side (nystagmus)
- Stumbling, wobbly gait (ataxia)
- Circling
- Rolling

Other clinical signs:

- Cataracts
- Chronic or recurrent episodes of inappetence
- Kidney disease

Diagnosis

Diagnosing *Encephalitozoon cuniculi* in a rabbit is not straightforward. However, a presumptive diagnosis can be made based on a combination of factors. These include the history you provide, a physical examination, specific disease tests, and the elimination of other diseases. In some cases, additional tests like complete blood work and diagnostic imaging may be necessary to assess your rabbit's overall health.

Diagnostics:

- Physical examination
- Complete blood work (CBC and biochemistry)
- Diagnostic imaging (x-rays or advanced imaging)
- Antibody titer testing (IgG and IgM)
- Inflammatory proteins (C-reactive protein)



Rabbit with head tilt

Treatment

Treatment for *E. cuniculi* poses many challenges. This is primarily because signs develop long after infection occurs and there is a chance of recurrence even with treatment. Therefore, few controlled studies about potential therapies exist. However, there is hope for improving or resolving clinical signs with the currently available treatments. Additionally, some cases appear to resolve spontaneously without treatment. Benzimidazole-type drugs are currently the treatment of choice due to their anti-inflammatory actions and proven disruptions of the membranes and components of the parasite. In a single trial, fenbendazole (a benzimidazole drug) administered once daily for 28 days was effective in preventing infection in rabbits and is a common drug of choice for treating *E. cuniculi* in rabbits.

Benzimidazoles are not risk-free medications and may lead to severe suppression of your rabbit's ability to make red blood cells or cause severe impairment of the lining of their digestive tract. To minimize these risks, it is imperative to strictly adhere to prescribed dosing regimens and monitor complete blood counts before, during, and after treatment.

Other treatments used with benzimidazole-type drugs include non-steroidal anti-inflammatories, such as meloxicam, or steroid anti-inflammatories, such as dexamethasone. Currently, there is no research behind the use of anti-inflammatories for this purpose, though your veterinarian may choose to include them in a treatment plan. Steroid anti-inflammatories should be used with caution, as studies have shown that using high doses of steroids can lead to poor treatment response to fenbendazole.

Due to the variety of symptoms between individual pets, supportive care recommendations may also vary. Some rabbits can become very stressed from their neurologic signs and may require sedatives to calm them down.

Environmental changes are often required for rabbits with difficulty moving around due to a head tilt or rolling behavior. This may include moving their enclosure to a quieter part of the house, as stress can exacerbate rolling behavior. Other considerations are placing food and water within reach to ensure easy access when rabbits are minimally mobile and adding soft padding to the enclosure. Recumbency care is essential for rabbits on their side or who lack the mobility to groom themselves properly. Diligent cleaning and monitoring are required to prevent your pet from soiling themselves and developing urine scald and secondary skin issues. Assisted feeding may also be needed and can be performed with syringeable diets, such as Oxbow Animal Health Critical Care Herbivore, Emerald Herbivore Sustain, Science Selective Recovery Plus, and Sherwood Pet Recovery.

Special attention should be paid to the “down eye” of rabbits with a head tilt. This eye may come in contact with the floor at rest and require lubrication to protect the cornea (surface of the eye). This is also true in rabbits who are on their side and unable to stand.

If diagnosed early, rabbits with severe eye inflammation from the parasite (phacoclastic uveitis) may require special eye drops to reduce the inflammation or manage pressure within the eye. However, advanced cases of phacoclastic uveitis often require enucleation (removal of the eye) for management and control of pain.

Treatments:

- Benzimidazole medications (albendazole, fenbendazole, oxiabendazole)
- Anti-inflammatory medications
- Supportive care
 - Sedatives
 - Nutritional support
 - Modified environments
 - Recumbency care
 - Eye lubrication
 - Uveitis treatment

Risk to Others

Encephalitozoon cuniculi is potentially zoonotic and has been reported to infect many hosts, including rodents, humans, and non-human primates, regardless of the strain. Immunocompromised individuals are at greater risk of infection.

This parasite can persist in the environment without appropriate cleaning solutions and contact time. Appropriate cleaning solutions:

- 0.1% bleach for 10 minutes
- 70% ethanol for 30 seconds

Risk Factors and Transmission

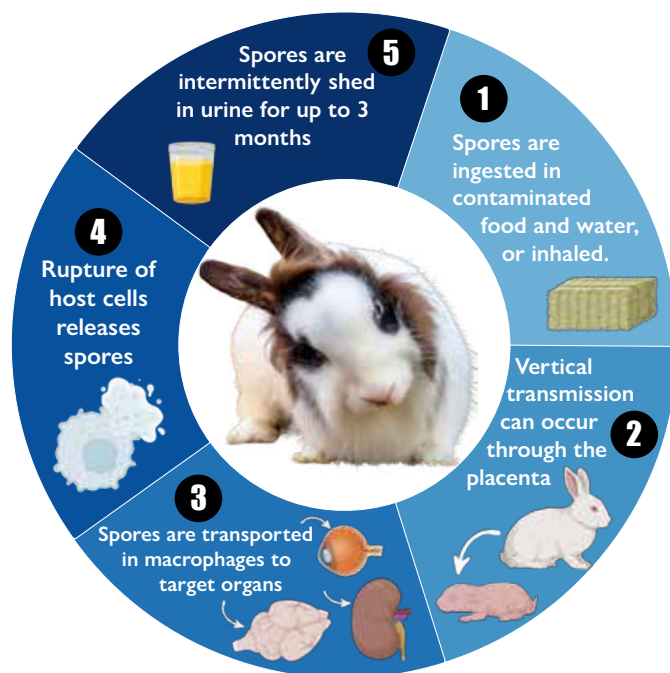
Encephalitozoonosis is a widespread disease, affecting approximately 50-75% of conventional rabbit colonies. Surveys in South America report prevalence rates as high as 90%.

Most rabbits become infected when they are young or during gestation from their dam (mother). *E. cuniculi* spores are shed through the urine of an infected individual and then either ingested or inhaled by another rabbit, resulting in infection.

For breeding colonies, determining the *E. cuniculi*-antibody status of the breeding population can help select negative individuals and establish an *E. cuniculi*-negative rabbitry.

Prognosis

The long-term prognosis for rabbits infected with *E. cuniculi* depends on the form of the disease, the individual's immune state, and the severity of the clinical signs. Some rabbits may recover from an active infection and have persistent signs, such as a head tilt, that may need ongoing support through environmental changes. Others may resolve their symptoms and develop new symptoms years later. Rabbits with the ocular form of this disease often do not have systemic or neurologic signs and have an excellent long-term prognosis.



Infection and Transmission of *E. cuniculi*

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References

1. Fisher PG, Kunzel F, Rylander H. Neurologic and Musculoskeletal Diseases. In: Quesenberry K, Orcutt CJ, Mans C, Carpenter JW, editors. *Ferrets, Rabbits, and Rodents Clinical Medicine and Surgery*. 4th ed. Missouri: Elsevier; 2021. p. 233-249.
2. *Encephalitozoon cuniculi* in pet rabbits: diagnosis and optimal management. LV Latney, CW Bradley, NR Wyre. *Veterinary Medicine: Research and Reports* 2014;5: 169–180
3. Abu-Akkada SS, Oda SS. Prevention and treatment of *Encephalitozoon cuniculi* infection in immunosuppressed rabbits with fenbendazole. *Iran J Vet Res*. 2016 Spring;17(2):98-105.
4. Graham, Jennifer E., Michael M. Garner, and Drury R. Reavill. “Benzimidazole toxicosis in rabbits: 13 cases (2003 to 2011).” *J Exot Pet Med* 23.2 (2014): 188-195.
5. Doboși, Anca-Alexandra, et al. “A Review of *Encephalitozoon cuniculi* in Domestic Rabbits (*Oryctolagus cuniculus*)—Biology, Clinical Signs, Diagnostic Techniques, Treatment, and Prevention.” *Pathogens* 11.12 (2022): 1486
6. Baldotto, Suelen Berger, et al. “Seroprevalence of *Encephalitozoon cuniculi* infection in pet rabbits in Brazil.” *J Exot Pet Med* 24.4 (2015): 435-440.
7. Suter, C., et al. “Prevention and treatment of *Encephalitozoon cuniculi* infection in rabbits with fenbendazole.” *Vet rec* 148.15 (2001): 478-480.
8. Fisher, Peter G. “Standards of care in the 21st century: the rabbit.” *J exot pet med* 19.1 (2010): 22-35.