

Encephalitozoonosis

What is Encephalitozoon cuniculi (*E. cuniculi*), and how is it spread?

Encephalitozoon cuniculi is a protozoan parasite.

The most common method of transmission is through the oral ingestion of spores from the urine of an infected rabbit. Transmission can also occur in utero from an infected dam, or through inhalation. After the spores enter the body they travel through the blood stream to various organs, including the brain.

A healthy immune system prevents the organisms from multiplying, but the spores remain viable. Times of immunosuppression (stress, illness, aging) may result in clinical disease many years after initial infection.

Symptoms:

Most immunocompetent rabbits develop chronic, subclinical infections (no symptoms). In clinically affected individuals the most common presentation is neurologic disease, however a variety of clinical disease may occur.

- Neurologic disease: head tilt, nystagmus, ataxia, rolling, seizures, paresis, urinary incontinence, tremors, a stiff rear gait
- Ocular disease: phacouveitits (appears as a white mass within the eye), lens rupture, cataract
- Kidney disease: anorexia, lethargy, dehydration, increased thirst, increased urination
- Abortion and neonatal death
- Chronic, reoccurring GI stasis/ileus

How is *E. cuniculi* diagnosed?

Diagnosis of *E. cuniculi* is difficult, as there is not an easy test to look for the presence of the parasite. Your doctor will likely request several diagnostics to fully evaluate your rabbit.

- *Basic blood work (CBC, blood chemistry)*: This allows for evaluation of overall organ function and signs of inflammation. Most rabbits with *E. cuniculi* have normal blood work, but we may see elevations in the kidney values if they are affected by the disease
- *Radiographs or CT scan*: In rabbits with a head tilt, or other neurologic signs, imaging is often recommended to rule out other conditions, such as an inner ear infection, trauma, or tumor
- *Serology*: This is the most important tool for diagnosis of *E. cuniculi* infection. This test detects the presence of antibodies in the blood against *E. cuniculi*. Antibodies develop within 3 weeks post-infection and can remain high for several months after exposure. The antibodies then decrease slightly but can persist for years with fluctuating levels.
 - Positive results only indicate exposure to the organism, it does not differentiate between rabbits with active infection, or latent (dormant) infection, or those that are no longer infected
 - There are three components to the serology test – IgG, IgM and c reactive protein (CRP). The presence of a higher IgG titer (greater or equal to 1:1024) in addition to an

elevated IgM titer (greater than or equal to 1:64) and increased CRP level indicates the presence of an active infection.

How is it treated?

It is challenging to assess the efficacy of therapeutic agents against *E. cuniculi* due to the difficulty in detecting the organism, but also because latent (dormant) infections occur and some clinical cases resolve spontaneously without treatment due to the host's immune response.

- Benzimidazoles (fenbendazole most commonly) – antiprotozoal drug commonly used to eliminate the *E. cuniculi* spores
 - There are reports of Benzimidazole drugs causing severe side effects in some rabbits, including bone marrow suppression and death. Evaluation of intratreatment CBC is recommended.
- Anti-inflammatory therapy (steroids, NSAIDs) – used to control inflammation of tissues associated with the presence of the organism
- Other therapy may be started as necessary, such as:
 - Motion sickness medication in rabbits with severe head tilt, such as Meclizine
 - Management of ocular disease, including eye drops or surgery
 - Nutritional and fluid support

Treatment for encephalitozoonosis is not always successful but can result in improvement in some cases. Lack of response to treatment can result in death in severely affected individuals.

How can I prevent *E. cuniculi*?

The mainstay of prevention is to reduce the risk of transmission and infection. When a rabbit is infected (with either clinical or subclinical disease) they can excrete spores in the urine in large numbers for up to 2.5 months after initial infection. The spores can be intermittently shed in the urine in low levels for the life of the rabbit, or until the rabbit's antibodies establish a balance between host and pathogen (the spores go dormant).

The spores can survive outside the rabbit in the environment for up to 6 weeks at room temperature. Spores are inactivated when exposed to the following disinfectants for 30 minutes at recommended concentrations: ethanol 70%, or formaldehyde 0.3%, or hydrogen peroxide 1%, or sodium hydroxide 1%.

Currently there is no readily accessible test available to check for spores in the urine.

Zoonosis

E. cuniculi can infect humans. Immunocompromised humans, such as transplant recipients, those infected with HIV, children, travelers, contact lens wearers, and the elderly, are at the highest risk of infection