Encephalitozoonosis (from *Encephalitazoon cuniculi*) in Rabbits

**Basics**

**OVERVIEW**

- Encephalitozoonosis is a disease caused by *Encephalitozoon cuniculi*.
- *Encephalitozoon cuniculi* is a microscopic, protozoan parasite that infects rabbits and other mammals. In most cases, it only causes disease in animals that do not have a fully functioning immune system.
- Infection occurs when rabbits eat the microscopic spores in urine-contaminated food, such as grass or hay that another rabbit has urinated on. In the normal life cycle of the parasite, spores spread to the kidneys, where the parasite reproduces, resulting in spores being passed in urine 6 weeks after infection. The passing of spores in the urine peaks 2 months postinfection and ends 3 months postinfection. In most cases, very little damage occurs in the kidneys, and most rabbits do not show symptoms of infection.
- If a rabbit is pregnant during infection, the spores tend to go into the eyes of the developing babies; replication of spores within the lens of young rabbits can cause cataracts, lens rupture, and other potentially serious eye disease.
- In some rabbits, the spores travel to the brain and other internal organs, rather than just the kidneys. The spores can remain inactive in these tissues for long periods of time. When the rabbit becomes immunosuppressed (due to stress, other diseases, etc.), the spores begin to reproduce, causing inflammation in the nervous system or other organs.
- How often *E. cuniculi* actually causes neurologic (brain and spinal cord) disease is controversial. This is because it is not possible to diagnose the disease in a live animal. Even studies looking at how often *E. cuniculi* causes disease in rabbits that have died are inconclusive, since many rabbits that have large numbers of spores and inflammation in the brain never had symptoms when they were alive.

**SIGNALMENT**

**Breed Predilections**

Dwarf breeds more commonly have disease.
**Mean Age and Range**
Eye disease is more common in younger rabbits; nervous system disease may be more common in middle-aged to older rabbits.

**Predominant Sex**
None

**SIGNS**
- Symptoms are determined mainly by site and extent of organ damage; eye and nervous system disease are most commonly reported.
- Disease—caused by reactivation of infection (encysted *E. cuniculi* organisms); caused by decreased ability to produce a normal immune response (known as immunosuppression), which allows the organism to begin reproducing and to infect new cells
- Nervous system signs—head tilt, wobbly, uncoordinated, or drunken-appearing gait or movement, known as ataxia; ataxia can be so severe that the rabbit cannot stand or rolls continuously when trying to stand up. Other symptoms include seizures, tremors, weakness (paresis) or paralysis.
- Signs involving the eyes—cataracts most common. The cataracts may become so severe that the lens ruptures, causing inflammation of the iris (pigmented part of the eye) and other areas in the front part of the eye (known as uveitis); white spots on the iris; blood in the anterior chamber of the eye (the front part of the eye, between the cornea and the iris; accumulation of blood known as hyphema)
- Signs of other organ system involvement are rare—they range from signs of kidney failure to heart failure, depending on which organ is involved.

**CAUSES**
*Encephalitozoon cuniculi*—a protozoan parasite

**RISK FACTORS**
- Inability to develop a normal immune response (known as immunosuppression)—may increase likelihood of infection or reactivation of infection—stress, poor diet, concurrent disease, and giving oral steroids or antitumor chemotherapy. Rabbits with subclinical infections often show symptoms following one or more of these events.

**TREATMENT**

**APPROPRIATE HEALTH CARE**
- Usually outpatient
- Inpatient—severe disease; rabbits that cannot eat or maintain hydration

**ACTIVITY**
- Restrict or confine—rabbits with neurologic signs; provide padded cages for rabbits that are severely ataxic, seizing, or rolling.
- Encourage return to activity as soon as safely possible; activity may enhance recovery of balance.

**DIET**
- It is absolutely imperative that the rabbit eat. Although rabbits cannot vomit, many appear to experience nausea with balance disorders and stop eating. If this happens, potentially life-threatening disease of the intestinal tract may occur (gastrointestinal stasis, bacterial overgrowth). Offer a large selection of fresh, moistened greens such as cilantro, romaine lettuce, parsley, carrot tops, dandelion greens, spinach, collard greens, etc., and good-quality grass hay. Also, try offering the rabbit’s usual pelleted diet. If the rabbit refuses these foods, syringe-feed a gruel such as Critical Care for Herbivores (Oxbow Pet Products) or Emeraid Herbivore (Lafeber Company, Cornell, IL); feed as much as the rabbit will readily accept. Alternatively, pellets can be ground and mixed with fresh greens, vegetable baby foods, water, or juice to form a gruel. Do not feed starchy, sweet, or fatty foods.
- Encourage drinking by offering fresh water and wetting leafy vegetables.

**MEDICATIONS**
Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered all-inclusive.
- Antiparasitic drugs—fenbendazole, oxibendazole, or albendazole (can cause low red-blood cell count [anemia], low white-blood cell count [leukopenia], and low platelet count [thrombocytopenia]); other antiparasitic drugs
such as ponzuril have been used.

- Anti-inflammatory drops applied to the eye directly (known as topical treatment)—flurbiprofen or other nonsteroidal anti-inflammatories to treat inflammation of areas in the front part of the eye (uveitis)
- Meclizine—used to treat dizziness and accompanying nausea

**FOLLOW-UP**

**PATIENT MONITORING**

- Make sure the rabbit continues to eat and stays clean and dry if immobile because of severe nervous system symptoms.
- Gradually increase exercise as improvement is noted.
- In patients with eye disease, monitor for worsening of symptoms, pain, rupture of lens or eye; seek regular veterinary monitoring for the development of glaucoma.

**PREVENTION/AVOIDANCE**

- Clean environment daily; spores are inactivated by most common disinfectants. Select rabbits that have been tested for *E. cuniculi* before breeding, when possible.
- Blood testing prior to purchase or addition of a new rabbit may be helpful. Blood tests (antibody or serologic testing) usually become positive within 2 weeks of infection; however, infected rabbits will only pass spores for 3 weeks following infection. After this period, rabbits are not contagious, even if the blood tests remain positive.

**POSSIBLE COMPLICATIONS**

- Eye disease—glaucoma, requiring surgical removal of the eye
- Head tilt is common, and may stay tilted lifelong. Most rabbits adjust to this and appear to live good-quality lives.
- Repeated episodes of neurologic symptoms
- Serious blood disorders causing spontaneous bleeding with some antiparasitic drugs, especially albendazole
- Death or permanent disability

**EXPECTED COURSE AND PROGNOSIS**

- Prognosis—guarded; varied response to drug treatment; many rabbits improve with supportive care alone
- Acute, severe neurologic signs—guarded to poor prognosis; some improve with supportive care
- Residual deficits (especially neurologic; head tilt) cannot be predicted until after a course of therapy
- Eye disease—variable response to medical therapy; surgical removal of the lens is necessary to prevent progression to glaucoma; eye disease is not expected to progress to nervous system disease
- Severe muscular or neurologic disease—rabbits usually become disabled lifelong

**KEY POINTS**

- There is no way to definitively diagnosis *E. cuniculi* as the cause of nervous system symptoms. Usually, the diagnosis is based on eliminating all other causes of nervous system disease. A positive blood test (serologic or antibody test) does not mean that *E. cuniculi* is causing nervous system disease, only that they have been exposed to the parasites. Many rabbits (up to 80% in some studies) have been infected with *E. cuniculi* in the past; many of these never develop disease, yet they still test as positive, lifelong.
- Newborn animals and animals that cannot develop a normal immune response (severely immunocompromised animals) may develop disease.
- Many rabbits with neurologic disease will improve. Many improve with supportive care alone (assisted feeding, padded environment, good nursing care), with or without treatment with antiparasitic drugs. It is currently unknown if antiparasitic drugs can successfully treat rabbits with neurologic disease caused by *E. cuniculi*.
- There is some zoonotic potential. Zoonotic potential refers to diseases that can be passed from animals to people. All confirmed human cases have been in people with seriously impaired immune systems.
Notes

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