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# *Encephalitozoon cuniculi* (*Nosema cuniculi*, *Nosema muris*, Infectious motor paralysis)

**Prevalence**

- Infects a variety of mammalian hosts
- Extremely common in the domestic rabbit
- Relatively rare in other lab animal species

**Significance**

- Usually low in studies involving rats and mice
- Significant in studies involving passage of transplantable tumours and other materials
- May alter humoral immune responses

**Disease**

- Obligate intracellular, eukaryotic microsporidian parasites closely related to fungi
- Spores evident as gram-positive ovoid using tissue Gram stains (carbol fuchsin)
- Following extrusion of sporoplasm from spore coat, sporoplasm may invade susceptible host cell
- Target organs of high blood flow – moderate to severe lesions in lung, liver, and kidney (occasionally myocardium, heart and brain lesions also evident)
- Lesions frequently confined to kidney – focal, irregular, depressed areas 1-100mm in diameter
- On cut surface, indistinct, linear, pale gray-white areas may extend into underlying cortex
- Characterized by the presence of a coiled polar filament in the mature spore stage
- Serum antibody titers detectable by 3-4 weeks – high titers by 6-9 weeks
- Frequently subclinical – rabbits may present:
    - neurological signs - head tilt, ataxia, vestibular signs, behavioral changes
    - uveitis and cataracts in young rabbits

**Transmission**

- Mainly horizontal – orofaecal route, vertical - transplacentally
- Through organisms excreted in urine
- Rabbits – readily infected experimentally by oral or respiratory route
- Iatrogenic transmission through contaminated needles
- Known to be contaminant of transplantable tumours
- Humans susceptible to zoonotic infection – severe disease in immunosuppressed

**Diagnosis**

- Preferred - ELISA testing of serum or DBS samples – results should always be confirmed by clinical history and/or histopathology
- Identification of characteristic lesions

- Demonstration of organisms in tissue sections
- Readily differentiated from protozoal infections by tissue tropisms and staining properties
- Differential diagnosis for rabbits – otitis interna, toxoplasmosis, and *Baylisascaris* migration

**Strains**

- Mice - strain differences in susceptibility:
    - resistant - BALB/c, A/J, SJL
    - susceptible - C57BLI6, DBA/1, 129/J
    - lethal in nude mice

**Duration**

- Chronic, usually latent infection (may be present for > 1 year)
- Spores seen in urine at 1 month – excreted in large numbers up to 2 months
- Spore shedding terminated by 3 months
- Spores survive less than 1 week at 4°C, viable for at least 6 weeks at 22°C

**Durability**

- Spores are resistant to drying for up to 4 weeks
- Use of sporicidal disinfectants and high temperatures thought to be effective

**Screening**

- Common and potentially deadly pathogen of rabbits which has prompted growing concern and increased demand for regular screening

**Prevention and Control**

- No known effective chemotherapeutic agents
- Serologic testing and selection of antibody free breeding stock
- Caesarean rederivation, improved sanitation and barrier maintenance in rats and mice
- Mice and rats should not be housed near known infected rabbit stocks

**Reading**


- Stephen W. Barthold, Stephen M. Griffey, & Dean H. Percy. Pathology of Laboratory Rodents and Rabbits (Fourth Edition), 2016
- Infectious diseases of Mice and Rats. National Academy Press: ISBN 0-309-03794-8