BAYLISASCARIASIS

Animal group (s) affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
Avian Mammal Human	Ingestion of embryonated eggs or infected intermediate hosts	Depression, lethargy, agitation, tremors, head and/or body tilt, circling, ataxia, lateral recumbency, coma	Asympto matic to fatal	No highly effective treatment exists, ocular larva migrans can be killed using a laser	Personal/ environment hygiene, wear gloves when working with known infected animal/ equipment	Yes

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Susceptible animal groups Avian, Mammal, Human

Causative organism

Recognized species of *Baylisascaris*

Parasite	Primary Definitive Host(s)
B. procyonis	Raccoons and other procyonids (e.g., kinkajou)
B. columnaris	Skunks
B. melis	Badgers
B. devosi	Martens, fishers
B. transfuga	Bears
B. schroederi	Giant pandas
B. tasmaniensis	Tasmanian devils, quolls, native "cats"
B. laevis	Marmots, ground squirrels

Zoonotic potential Yes

Distribution

Baylisascaris procyonis is a common parasite of raccoons (*Procyon lotor*) in several regions of the United States and Canada and has been introduced with raccoons to Japan and several countries in Europe. In the United States, the highest prevalence rates occur in the Midwestern, Northeastern, and Western states. In the Southeastern U.S., infections are more common in mountainous regions; but has been found in isolated areas of Georgia and Florida. In Canada, *B. procyonis* is found in British Columbia, Nova Scotia, Ontario, Prince Edward Island, and Quebec.

Current distribution maps are unavailable for the majority of other known *Baylisascaris* spp. within the U.S. and Canada, *B. columnaris*, *B. melis*, and *B. transfuga* likely pose a zoonotic risk to humans and are probably found throughout the range of their natural hosts.

Incubation period

Once ingested, larvae may migrate through numerous tissues, including the brain, as early as 3 days post infection. In susceptible species, central nervous system disease can

be observed 9-10 days post-infection. In more resistant species or if low numbers of larvae are ingested, CNS symptoms may not appear until 2-4 + weeks post-infection.

Clinical signs

Clinical signs in intermediate hosts, including humans, vary based on number of larvae ingested, the tissues through which larvae migrate, and species of host. Pathogenicity varies among *Baylisascaris* sp. *B. procyonis* and *B. melis* are the most pathogenic, followed by *B. columaris* and little is known about other *Baylisascaris* spp.. Clinical signs may include, but are not limited to, depression, lethargy, tremors, partial paralysis, head or body tilts, ataxia, circling, mental delays, easy agitation/ irritability, and death.

Post mortem, gross, or histologic findings

Many effected animals will have no gross lesions. However, inflammation and traumatic damage may be observed through the liver, lungs, and other organs of animals infected with large numbers of larvae. In these hosts, granulomas may be grossly visible in many tissues such as the liver, lungs, heart, diaphragm, pancreas, spleen, kidneys, mesentery, mesenteric lymph nodes, intestinal wall, skeletal muscles, brain, and eyes. Histologically, extensive inflammatory tracts and larvae may be observed.

Diagnosis

Humans: Highly suspect *Baylisascaris* infections can be diagnosed using serologic methods such as indirect immunofluorescence, ELISA, and Western blotting.
Animals: Postmortem necropsies of suspected animals are the most conclusive way to diagnose *Baylisascaris* infections. In suspected intermediate hosts, clinical signs, history of exposure, serology, post mortem necropsies, and recovery and/or identification of larvae can be used to diagnose *Baylisascaris*. Fecal floats or necropsy and examination of small intestine can be used to diagnose infection in definitive hosts. For treatment, several types of anthelmintics are 95-99% effective.

Material required for laboratory analysis

Adult nematode specimens may be examined microscopically and identified morphologically although adult males are needed to determine species. Genetic identification may be needed for larva migrans found in intermediate hosts and/or immature nematodes in definitive hosts.

Relevant diagnostic laboratories

Veterinary clinics can run routine fecal exams to diagnose infection in definitive hosts. In intermediate hosts, veterinary diagnostic laboratories capable of PCR analysis and/or histology should be able to perform diagnostic testing on suspected animal cases. Human cases should be referred to the Health Department or the CDC for testing.

Treatment

Currently there is no highly effective treatment for larva migrans associated with *B. procyonis* in humans. Ocular larva migrans can be killed using lasers followed by a regime of anti-inflammatory drugs and steroids to aid in the possible recovery of any remaining visual acuity.
Raccoons, skunks, dogs, and bears can be successfully treated with common antihelmintics such as pyrantel pamonate (20 mg/kg), ivermectin (1 mg/kg), moxidectin (1 mg/kg), albendazole (50 mg/kg x 3 days), fenbendazole (50 mg/kg x 3 days), and flubendazole (22mg/kg x 3 days). Animals should be monitored regularly after treatment to ensure complete clearance of worms.

Prevention and control

Continued education of the public, human health, wildlife, and veterinary professionals should be made a priority. Recent research using antihelmintic baits combined with the removal of latrine sites has shown to decrease prevalence rates among intermediate hosts. Further research is needed to determine the exact distribution, potential for spread, transmission dynamics, and impacts on wildlife.

Suggested disinfectant for housing facilities

Areas should be cleaned immediately to avoid accidental ingestion of eggs by children or pets. Eggs are not immediately infectious and must develop in the environment for a period of time (11-14 days) before becoming infective. Frequent sanitation will limit the buildup of eggs on these surfaces. However, eggs will continue to accumulate in the surrounding environment and once the eggs embryonate, they can remain viable for several years.

Currently few methods are available for decontaminating areas infested with *B. procyonis* eggs. Highly concentrated caustic chemicals such as a 50/50 mixture of xylene and absolute alcohol, boiling lye, or boiling Lysol may be used to decontaminate potentially infected areas. The most effective way of decontaminating an area is flaming an area. Although burning is the most effective way to kill eggs, it is not useful for flammable areas such as roofs, decks, etc. In the laboratory, boiling water has been shown to kill eggs.

Notification

Baylisascariasis in humans is reportable in some states; check your local requirements. Infection in animals is not reportable.

Measures required under the Animal Disease Surveillance Plan None

Measures required for introducing animals to infected animal

Animals displaying neurologic symptoms are not infective to other intermediate hosts. However, impaired intermediate hosts are likely to become prey for various carnivore species. If ingested by an appropriate definitive host, the parasite cycle within a system could be perpetuated.

Definitive hosts known to harbor infections should be quarantined, placed on an antihelmintic regime, and monitored regularly for infection. Before placing susceptible animals in cages that had contact with infected animals, the cages should be decontaminated.

Conditions for restoring disease-free status after an outbreak None

Experts who may be consulted

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