

# Atoxoplasmosis

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Atoxoplasmosis, caused by the *Isospora*-like coccidian parasite *Atoxoplasma sp.*, is a severe, often fatal, disease of a wide variety of passerine birds, particularly young fledglings, with canaries being especially susceptible. There is confusion regarding the true identity of the organisms classified as *Atoxoplasma* and a growing consensus that it would be better placed in the *Isospora* genus and dissolving the *Atoxoplasma* genus.

The life cycle of the *Atoxoplasma* of canaries and other passerines appear to involve several extra-intestinal asexual generations, followed by sexual and asexual generations in the intestinal tract. The parasite undergoes an asexual reproductive cycle in the mononuclear cells and then disseminates through the bloodstream to parenchymal organs.

*Atoxoplasma sp.* are apparently host specific and birds are most likely affected by the ingestion of oocysts from the environment. Infection appears to be long-lived in individual birds, and fecal shedding has been reported to last as long as 8 months. The oocysts are hardy in the environment and not susceptible to most disinfectants making control difficult. The intermittent shedding of oocysts by adult birds and the persistence of the oocysts in the environment contribute to the transmission of the organism to the young birds in the population.

Clinical signs are non-specific but may include depression, anorexia, diarrhea, hepatomegaly (liver enlargement), and dilated gut loops, which may be visualized through the skin. Up to an 80% mortality rate from atoxoplasmosis has been seen in juvenile birds between two and 9 months of age.

Diagnosis can be made through the identification of the oocysts, which are approximately 20 $\mu$  long, in the feces. However, *Atoxoplasma* oocysts are not always present in the feces making the diagnosis of the disease or the identification of carrier birds difficult. Definitive diagnosis is usually achieved by identifying the organisms microscopically in buffy coat smears or histopathologically through liver biopsy or necropsy.

A PCR assay has been developed that will detect an rDNA fragment of *Atoxoplasma* in feces, blood, and tissues of infected birds. Results have shown that there are distinct, consistent differences in DNA sequences from the different species of birds tested, indicating that different species of passerines may be infected with distinct *Atoxoplasma* species. The DNA sequences were most closely related to *Isospora robini*, supporting the assertion that *Atoxoplasma sp.* are most closely related to *Isospora sp.*

The PCR assay can be used to diagnose clinical toxoplasmosis in both live birds and at necropsy, as well as identifying chronically infected birds. It can also be used to evaluate programs designed to decrease the morbidity and mortality of the disease and determining the efficacy of a treatment protocol.

No treatment has proven effective, although primaquine suppresses the tissue form and sulfachlorpyridazine may decrease oocyst shedding. Control is difficult due to the resistance of the oocysts in the environment and the difficulty in detecting the organism due to the intermittent shedding of oocysts or in birds that are harboring the extraintestinal form of the organism.

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