INCLUSION BODY DISEASE

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<th>Animal Group(s) Affected</th>
<th>Transmission</th>
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<td>Snakes, especially members of Boidae</td>
<td>Undetermined likely through direct contact; mites may be vector.</td>
<td>Acute: head tilt, disequilibrium and opisthotonos. Chronic: regurgitation, stomatitis and pneumonia. Asymptomatic carriers may exist.</td>
<td>Usually fatal.</td>
<td>None. Supportive therapy may be elected in individual cases.</td>
<td>Strict quarantine of new arrivals; Culling of infected snakes and mite control.</td>
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Fact Sheet Compiled by: Erica Lipanovich
Completed on: 3 August 2011; updated 24 February 2013
Fact Sheet Reviewed by: Tim Georoff; Juergen Schumacher

Susceptible Animal Groups: Primarily boid snakes. Similar inclusions have also been reported in palm vipers (*Bothriechis marchi*), Eastern kingsnakes (*Lampropeltis getulus*) and corn snakes (*Elaphe guttata*).

Causative Organism: It is most likely viral etiology, with historically retrovirus suggested as a possible causative agent, although recent studies implicate an arenavirus.

Zoonotic Potential: No

Distribution: US, Canada, Africa, Australia, Europe and the Canary Islands

Incubation Period: 2 weeks to 4-5 years.

Clinical Signs: Outbreaks often occur during periods of stress or after immune suppression. In boa constrictors, regurgitation, anorexia and CNS signs are common. In Burmese pythons, generally CNS disease is seen in the absence of regurgitation or other gastrointestinal signs. In all boid and possibly non-boid snakes, any of the following signs may be seen - anorexia, lethargy, chronic wasting, regurgitation, lose feces, stomatitis, dermatitis, pale mucous membranes, respiratory disease, cutaneous neoplasias, leukemias, dysecdysis, head tremors, depressed tongue flicking, dull mentation, loss of righting reflex, hyperreflexia, head tilt, rolling, disorientation, and stargazing. The common snake mite (*Ophionyssus natricis*) has been incriminated as a possible vector of IBD.

Post mortem, Gross or Histological Findings: Histological CNS findings include nonsupportive meningoencephalitis characterized by neuronal degeneration and mononuclear cell infiltrates in the brain and spinal cord, perivascular cuffing, gliosis and myelin degeneration. Additional findings may include subacute myocarditis, splenic fibrosis, depletion of splenic lymphocytes, interstitial pneumonia, periportal hepatitis, hepatic lipidosis, and ulcerative dermatitis. In boa characteristic eosinophilic intracytoplasmic inclusion bodies may be detected in sections of the brain, liver, lung, heart, spleen, kidney, stomach and pancreas. In pythons inclusions are often only found in the brain.

Diagnosis: An antemortem diagnosis can be made by the presence of typical eosinophilic intracytoplasmic inclusions in H&E stained biopsy specimen of the liver, esophageal tonsils and gastric mucosa. Rarely, inclusions are seen in WBCs on peripheral blood smears. Serological and PCR-based assays for antemortem diagnosis are still being developed. An ELISA has been developed to determine exposure of boa...
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Constrictors to specific antigens. Immunohistochemical testing of blood and tissues can be performed at University of Florida by staining against the 68-k protein. (http://labs.vetmed.ufl.edu/sample-requirements/microbiology-parasitology-serology/zoo-med-infections/boid-ibd/)

**Material Required for Laboratory Analysis:** Blood, serum or biopsies from the liver, tonsils or gastric mucosa. Contact laboratory for handling and shipping instructions.

**Relevant Diagnostic Laboratories:**
University of Florida Veterinary Diagnostic Lab  
c/o April Childress  
2015 SW 16th Ave  
Building 1017 Room V2-238  
Gainesville, FL 32608  
Phone: 352-294-4420  
Fax: 352-392-5464  
*Please contact April Childress (childressa@ufl.edu) prior to sample submission*

**Treatment:** There is no effective treatment for IBD! Supportive measures include of antimicrobial and fluid therapy., Provision of appropriate environmental conditions including temperature and humidity is essential. Diazepam may be useful for treatment of seizures.

**Prevention and Control:** Quarantine of all incoming snakes for a minimum of 90 days. Good hygiene, prevention of exposure to infected animals, pest control and removal of infected animals. Cleaning with most disinfectants and detergents. Temperatures below 37°C for four hours and above 50°C for one minute have been found to destroy arenaviruses, and may be helpful. Snakes showing clinical signs or have been diagnosed with IBD should be removed immediately from the main collection and moved into a separate room. Diagnostic samples mentioned above should be collected and submitted for evaluation. Infected snakes should be euthanized and necropsied.

**Suggested Disinfectant for Housing Facilities:** Sodium hypchlorite and chlorhexidine. Cages of ill or dead animals should be disinfected with bleach and left out in the sun for a few days to dry.

**Notification:** No

**Measures Required under the Animal Disease Surveillance Plan:** None

**Measure Required for Introducing Animals to Infected Animal:** Not recommended

**Conditions for Restoring Disease-Free Status after an Outbreak:** Sick snakes should never be introduced into an established collection. Opinions vary from testing the entire group to extensive monitoring, or culling all exposed snakes. It is unknown what percentage of snakes with IBD will develop clinical signs and how many will remain clinically healthy.

**Experts Who May Be Consulted:**
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References: