

ADENOVIRUS INFECTION in Reptiles

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE?	TREATMENT	PREVENTION & CONTROL
Lizards Snakes Also detected in chelonians and crocodiles	Most likely virus excreted in the faeces and ingested Respiratory droplets Vertically Inapparent carriers in adults	Unspecific Poor doers Poor appetite Sometimes diarrhea Sudden death Young lizards, 4 to 12 weeks old more affected	Not always. Inapparent carriers in adults	None against the virus Control of secondary bacterial infections, supportive treatment	Quarantine, PCR testing of newly introduced animals, hygiene.

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Susceptible animal groups: Most commonly found in squamata lizards. Agamid lizards: <i>Pogona vitticeps</i> (bearded dragon), <i>Pogona henrylawsoni</i> (Rankin's dragon), <i>Physignatus</i> spp. (water dragon). Chameleons: <i>Chamaelo jacksoni</i> (Jackson's chameleon), <i>Chamaelo montium</i> (mountain chameleon). Gekkota: <i>Hemitheconyx caudicinctus</i> (fat-tail gecko), <i>Eublepharus macularis</i> (leopard gecko), <i>Gekko gecko</i> (tokay gecko). Helodermatids: <i>Heloderma suspectum</i> (Gila monster), <i>Heloderma horridum</i> (Mexican beaded lizard). Monitors: <i>Varanus exanthematicus</i> (savannah monitor), <i>Varanus prasinus</i> (emerald monitor). Skinks: <i>Tiliqua scincoides intermedia</i> (blue-tongued skink), Also often detected in snakes. Boids: <i>Boa constrictor</i> (common boa), <i>Lichanura trivergata</i> (rosy boa). Viperids: <i>Crotalus scutulatus scutulatus</i> (Mojave rattlesnake), <i>Bothriechis marchi</i> (palm viper), <i>Vipera aspis aspis</i> , (asp viper). Colubrids: <i>Elaphe guttata</i> (corn snake), <i>Lampropeltis zonata multicincta</i> (Sierra mountain kingsnake), <i>Lampropeltis getula californiae</i> (California kingsnake), <i>Pituophis catenifer</i> (Pacific gopher snake). Recent reports from chelonians: <i>Inotestudo forsteni</i> (Sulawesi tortoise), <i>Trachemys scripta elegans</i> (red-eared slider), <i>Terrapene ornata ornata</i> (ornate box turtle) Earlier single report from crocodiles: <i>Crocodylus niloticus</i> (Nile crocodile)	
Causative organism Family <i>Adenoviridae</i> , mainly genus <i>Atadenovirus</i> , also genus <i>Siadenovirus</i> and unclassified (only in turtles)	
Zoonotic potential None	
Distribution World-wide	
Transmission Direct (fecal-oral), environmental (droplets), vertical (suspected to be through the egg in utero, or at time of oviposition)	
Incubation period Not known	
Clinical symptoms Unspecific, poor growth, poor appetite, sometimes diarrhea, sudden death, dermatitis in snakes. Mostly young animals, 4 to 12 weeks old, are affected. In snake adult animals can be affected too.	
Post mortem findings Possible findings: gastro-enteritis, stomatitis, oesophagitis, hepatitis, nephritis, pneumonia and encephalitis. Many bearded dragons don't show significant gross lesions.	



Microscopically: hepatic necrosis often with inflammatory cells in the sinusoids. Large basophilic intranuclear inclusion bodies in the hepatocytes and Kupffer cells. stomatitis, esophagitis, gastro-enteritis with intranuclear inclusion bodies in the epithelium. Intranuclear inclusion bodies in glial cells and endothelial cells in the brain.

Diagnosis

Polymerase Chain Reaction (PCR), in situ hybridization, histology (basophilic intranuclear inclusion bodies), transmission electron microscopy, virus isolation (if possible). Serological testing for antibodies against adenoviruses has been described in snakes using a neutralization test.

Material required for laboratory analysis

Fresh cloacal swabs, feces or tissues (liver best, also lung, kidney, intestine, etc.) at best in medium or saline solution containing antibiotics or frozen for PCR and virus isolation. Formalin fixed material (liver as well as other tissues, e.g. intestine) for histology and possibly also for PCR.

Relevant diagnostic laboratories

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Treatment

Use of antibiotics to control secondary infections. E.g. enrofloxacin, marbofloxacin, trimetoprim-sulfamethoxazole. Supportive treatment.

Prevention and control in zoos

- Quarantine new reptiles for a minimum of 90 days in a separate room, with separate set of husbandry tools, separate air duct system, use footbaths with virucidal disinfectant (e.g. bleach) at entrance. Weigh the animals as they enter and exit the quarantine. House the animals individually.
- Necropsy all animals that are euthanised or die.
- Check for internal and external parasites; treat the animals against these common parasites. Disinfect used materials and housing on a regular basis

Suggested disinfectant for housing facilities

Virucidal disinfectants, e.g. 10% chlorine bleach solution, quaternary ammonium compounds, ammonia.

Notification

Guarantees required under EU Legislation

Guarantees required by EAZA Zoos

Measures required under the Animal Disease Surveillance Plan

Measures required for introducing animals from non-approved sources

Measures to be taken in case of disease outbreak or positive laboratory findings

Conditions for restoring disease-free status after an outbreak

Contacts for further information

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