RANAVIRUS INFECTION IN AMPHIBIANS

ANIMAL GROUP AFFECTED	AGE GROUP AFFECTED	TRANS-MISSION	CLINICAL SIGNS	FATAL DISEASE?	TREATMENT	PREVENTION & CONTROL
Amphibians Ranaviruses can also infect fish and reptiles	Larvae and metamorphs primarily Adults less often Eggs/ embryos can be affected but prevalence is unknown	Direct contact, cannibalism, through the water	skin ulceration, systemic haemorrhages, lethargy, erratic swimming, inappetence, "red leg"	May be epizootic with high mortality, dependant on virus and amphibian species	Control secondary bacterial growth	*In houses* Isolate affected amphibians. Tanks should have separate water sources. *in zoos* Isolate affected amphibians. Tanks should have separate water sources.

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Susceptible animal groups
Amphibians of the orders Anura and Caudata, salamanders (e.g. *Ambystoma* spp.), toads (e.g. *Bufo* spp.), frogs (e.g. *Limnodynastes* spp., *Rana* spp.) and others. Ranaviruses also infect fish and reptiles, and some ranavirus isolates may be able to infect animals from more than one class.

Susceptible age groups
Larvae and metamorphs are most affected. Adult morbidity and mortality occurs less often. The effect on eggs remains unknown. .

Causative organism
Ranaviruses. There are several different isolates of ranaviruses, some of which may be more host specific than others.

Zoonotic potential
No.

Distribution
Worldwide.

Transmission
Horizontal transmission: Direct contact, cannibalism, through the water.
Vertical transmission: Suspected but remains unknown.

Incubation period
Dependent on developmental stage, virus isolate, temperature, and amount of virus. Approx. 1 to several weeks.

Clinical symptoms
Infected amphbians often have swollen appendages and reddening of the skin. Anorexia, lethergy, ataxia. "Red leg" (although ranaviruses are not the only possible cause of "red leg" in amphibians). Chronically infected inapparent carriers have been described.

Post mortem findings
Necrotizing, vesicular, and ulcerative dermatitis, gastrointestinal ulceration, hepatic, splenic, renal, lymphoid and hematopoietic necrosis. Intracytoplasmic inclusions in cells of affected tissues.

Diagnosis
- PCR
- real-time PCR
- virus isolation (followed by immunofluorescence or immunohistochemistry)

- histology (followed by immunofluorescence or immunohistochemistry)

Material required for laboratory analysis
Liver and/or kidney samples from dead animals. Toe or tail clips, as well as cloacal or lesion swabs from live animals can be used for diagnosis

OIE Reference Laboratories

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Relevant diagnostic laboratories

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- Prof. Barry Hill, CEFAS Weymouth Laboratory, The Nothe, Weymouth DT4 8UB, UK
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Treatment
Control of secondary bacterial infection is the suggested therapy. Additionally, stress should be minimized.

Prevention and control in zoos

- Newly acquired animals should be kept isolated and should undergo thorough physical examinations both before and after quarantine. Tests for virus detection should also be carried out during quarantine. Different life stages can have different susceptibilities to disease, so testing should be done during different stages of development.
- Enclosures and all equipment should be disinfected regularly.
- Waste water should be treated for ranavirus inactivation.

Suggested disinfectant for housing facilities
All virucidal disinfectants. Remove debris from surfaces, then disinfect. Although others may be effective, Nolvasan (2%) and bleach (3%) for at least 1 minute exposure have been shown to inactivate ranaviruses. Rinse facilities well following disinfection.

Notification
Listed as notifiable by OIE.
Recommended on importation of amphibians from a non-ranavirus free country:

- Keep imported animals in biosecure environment for continuous isolation from the local environment
- Treat effluent and waste in a manner that ensures inactivation of ranaviruses
- Breed F-1 generation in quarantine
- Test F-1 generation at different life stages for presence of ranaviruses and pests
- If F-1 generation is found free of ranavirus and other pests, F-1 stock may be defined as free of infection with ranavirus

Guarantees required under EU Legislation
None for amphibians

Guarantees required by EAZA Zoos

Measures required under the Animal Disease Surveillance Plan
None currently. See: http://www.oie.int/Eng/normes/fcode/A_summry.htm

Measures required for introducing animals from non-approved sources
Suggested measures see notification.

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

Dead animals should be submitted for necropsy. Morbid animals should be immediately isolated and tested. If Ranavirus is diagnosed, the affected aquarium/terrarium should be quarantined, treatment initiated to prevent secondary bacterial infection and stress minimized. If the species is not a threatened or endangered species, euthanasia of positive animals should be considered.

Conditions for restoring disease-free status after an outbreak

None established. See: http://www.oie.int/Eng/normes/fcode/A_summry.htm

Contacts for further information

References

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