



## RIFT VALLEY FEVER

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Wild and domestic ruminants, camelids	Haematophagous mosquitoes of several genera. Direct transmission by contact with infected animals or material	Fever, inappetence, mucopurulent nasal discharge, abortion, bloody diarrhoea	Mortality: lambs to 90% adults 20-60% calves 10-30 (up to 70)%	None	<i>In house</i> Vector control  <i>in zoos</i> vaccination only under official directives

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<p><b>Susceptible animal groups</b> Domestic (cattle, sheep, goats) and wild ruminants (buffaloes, antelopes, wildebeest), camelids. African monkeys and domestic carnivores present a transitory viremia. Rodents are possible candidates as hosts in the maintenance cycle of RVF-virus in nature. Experimentally the virus infects a wide variety of laboratory, domestic and wild animals.</p>	
<p><b>Causative organism</b> Family: Bunyaviridae, genus Phlebovirus. Negative single stranded RNA, vector borne virus, enveloped, with three nucleocapsid segments. Two major lineages: Egyptian and Sub-Saharan. The virus survives several months in dried discharges at 4°C and is resistant to alkaline pH. <u>Biohazard</u>: Rift Valley Fever virus is a restricted animal pathogen, importation and possession is prohibited by law by most national governments. The virus is a biosafety level 3 pathogen.</p>	
<p><b>Zoonotic potential</b> Humans are very susceptible (major zoonosis). Infections in human beings are usually restricted to periods of intense epizootic activity. The human disease may be characterised by a non-specific influenza-like syndrome, recovery occurs within 4-7 days. Complications: retinopathy, blindness, meningo-encephalitis, haemorrhagic syndrome with jaundice, petechiae and death (ref 5.) Inactivated vaccines are available for laboratory and field workers exposed to high risk of infection.</p>	
<p><b>Distribution</b> Endemic in sub-Saharan Africa. Outbreaks also have occurred in Egypt, Madagascar, and most recently in the Arabian Peninsula. Large epizootics occur at irregular intervals and coincide with periods of heavy rainfall and high vector density.</p>	
<p><b>Transmission</b> Haematophagous mosquitoes of several genera (<i>Aedes</i>, <i>Anopheles</i>, <i>Culex</i>, <i>Eretmapodites</i>, <i>Mansonia</i>, etc.) can transmit RVF-virus as biological, competent vectors. <i>Aedes spp.</i> are the reservoir host. The virus is transmitted transovarially and can remain dormant in mosquito eggs during dry interepizootic periods! The transmission occurs also by direct contact and aborted material. <b>CAVE</b>: transmission without the involvement of an arthropod vector raises the possibility of virus importation into non-endemic areas, via contaminated material, animal products, viremic human beings or non-livestock animal species!!!</p>	
<p><b>Incubation period</b> In domestic sheep 30-72 hours, 12-36 hours in lambs</p>	

**Clinical signs**

- Fever, inappetence, cessation of lactation, icterus in adult sheep
- Mucopurulent nasal discharge
- Diarrhoea (bloody)
- Abortion: 90-100% of pregnant ewes abort (abortion storm), mortality in lambs rises 90% and 20-60% in adult sheep. In cattle the signs are less severe, with 10-30% mortality in young animals, but 90-100% abortion in pregnant cows.

**Post mortem findings**

- Liver: hepatic enlargement, orange-brown discoloration, foci of necrosis near the central veins or randomly scattered, eventually eosinophilic intranuclear inclusions (specificity in doubt), edema and haemorrhages of the gallbladder wall
- Disseminated intravascular coagulation
- Abortion, hydranencephaly in lambs
- Gastrointestinal, subserosal, subcutaneous haemorrhages
- Encephalitis (perivascular, with neuronal necrosis)

**Diagnosis**

- Histopathology
- Virus isolation using Vero E6 cells (African green monkey) or BHK-21 cells (Baby Hamster Kidney): cytopathic effect and plaque formation and/or in combination with immunofluorescence
- Serology (cross reactivity with other phleboviruses is possible):
  - Enzyme-linked immunosorbent assay - IgG and IgM
  - Virus neutralisation (not outside endemic areas, need live virus)
  - Fluorescent antibody test
  - Haemagglutination inhibition
  - Plaque reduction neutralisation
  - Complement fixation
  - Immunodiffusion
- RT-PCR (Reverse transcriptase-polymerase chain reaction)

**Material required for laboratory analysis**

- Liver, spleen, aborted material
- Blood: 5 ml serum or 10 ml blood (EDTA, Heparin), keep at 4°C or freeze

**EU Reference Laboratory**

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**OIE Reference Laboratories**

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**Treatment**

None.

**Prevention and control in zoos**

- Live attenuated vaccine (causes abortion in pregnant animals)
- Inactivated more expensive (produced using cell culture, avoids abortion)
- Mosquito larvicides and insecticides

**Suggested disinfectant for housing facilities**

The virus is inactivated by 56°C for 120 minutes (in serum), by pH < 6.8, by strong solutions of sodium or calcium hypochlorite (residual chlorine should exceed 5000 ppm), and is also inactivated by ether and chloroform.



<b>Notification</b> Yes
<b>Guarantees required under EU Legislation</b> Council Directive 92/119/EEC of 17 December 1992.
<b>Guarantees required by EAZA Zoos</b>
<b>Measures required under the Animal Disease Surveillance Plan</b>
<b>Measures required for introducing animals from non-approved sources</b>
<b>Measures to be taken in case of disease outbreak or positive laboratory findings</b> Systematic serological control of all susceptible animal stock.
<b>Conditions for restoring disease-free status after an outbreak</b> Consult national veterinary authorities.
<b>Contacts for further information</b> Dr. Luca Bacciarini, <a href="mailto:luca.bacciarini@ti.ch">luca.bacciarini@ti.ch</a>
<b>References</b> <ol style="list-style-type: none"><li>1. Jones, T.C., R.D. Hunt, and N.W. King. 1997. <i>Veterinary Pathology</i>, Williams &amp; Wilkins, Baltimore.</li><li>2. McGavin M.D., W.W. Carlton, and J.F. Zachary. 2001. <i>Thomson's Special Veterinary Pathology</i>. Mosby, St. Luis, London, Philadelphia, Sidney, Toronto.</li><li>3. Murphy, F.A., E.P.J. Gibbs, M.C. Horzinek, and M.J. Studdert. 1999. <i>Veterinary Virology</i>. Academic Press, San Diego, London, Boston, New York, Sydney, Tokyo, Toronto.</li><li>4. Strickland, G.T. 2000. <i>Tropical Medicine and Emerging Infectious Diseases</i>. W.B. Saunders Company, Philadelphia, London, Toronto, Montreal, Sydney, Tokyo.</li><li>5. OIE, 2000. <i>Manual of standards for diagnostic tests and vaccines</i>, 4th edition.</li></ol>