ENCEPHALOMYOCARDITIS VIRUS (EMC)

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<th>Animal Group(s) Affected</th>
<th>Transmission</th>
<th>Clinical Signs</th>
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<td>Mammals</td>
<td>Feco-oral, urine, or carcass ingestion. Rodents are asymptomatic carriers.</td>
<td>Range from non-clinical signs to nonspecific (lethargy, anorexia) to cardiac failure and sudden death</td>
<td>Many infections are asymptomatic, but may manifest as sudden death</td>
<td>Supportive care for cardiac failure if possible</td>
<td>Rodent and rodent feces control</td>
<td>Yes</td>
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Fact Sheet compiled by: Erika Travis-Crook

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Fact Sheet Reviewed by: Nancy Carpenter; Kay Backues

Susceptible animal groups: Mammals, including humans

Causative organism: Encephalomyocarditis virus which belongs to genus Cardiovirus in the family Picornavirus. The traditional virus should be labeled EMCV-1 as a new strain isolated from a wood mouse is being called EMCV-2. The new strain can be distinguished serologically and by molecular testing. The host range of EMCV-2 remains to be determined.

Zoonotic potential: Yes. Infection in humans is common although many are asymptomatic and unrecognized.

Distribution: Worldwide, free ranging and captive. In US, disease primarily seen in states bordering the Gulf of Mexico.

Incubation period: Viremia may occur within 24 hours of infection.

Clinical signs: Many infections are nonlethal and probably subclinical. Subtle nonspecific clinical signs include lethargy, anorexia, listlessness or dyspnea. Signs of acute heart failure may occur, especially in primates and artiodactylids. Typical presentation is death without any prior signs of illness. Neurologic signs are not common except in smaller non-human primates and some rodents.

Post mortem, gross, or histologic findings: Gross findings primary limited to cardiovascular system: myocardium severely marked with pale streaks, petechiae or ecchymosis on the epicardial surface. Sequelae to heart failure such as pulmonary edema, hydrothorax, hydropericardium, froth in trachea or bronchi, and fibrin in the body cavities. Pulmonary edema is often severe and dramatic, lungs are wet and heavy. Histologic findings include lymphocytic, plasmacytic necrotizing myocarditis; congested and markedly edematous lungs. Encephalitis is frequently seen in rodents, and may be seen in larger animals but the CNS infrequently is submitted for larger animals.

Diagnosis: Histologic appearance of affected tissues is very suggestive of disease. Further diagnostics to be considered include polymerase chain reaction (PCR); virus isolation from tissues – fresh or frozen; serologic testing via virus neutralization (VN), hemagglutination-inhibition, or ELISA for paired titer, although this route is not very helpful in acute cases. If animals survive, antibody testing may be helpful.

Material required for laboratory analysis: PCR on whole blood, serum, plasma, or tissue (fresh or frozen)
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so at necropsy liver, heart, and spleen should be collected in most animals. Tissues for virus isolation: heart muscle, spleen, liver and brain from wildlife species. In addition, take intestine from rodent species.

Relevant diagnostic laboratories:
Zoologix Inc. (PCR)
9811 Owensmouth Avenue, Suite 4
Chatsworth CA 91311-3800
Phone: 818-717-8880
Fax: 818-717-8881
Email: info@zoologix.com
www.zoologix.com

Texas A&M Veterinary Medical Diagnostic Laboratory (Virus neutralization)
College Station Laboratory
PO Box Drawer 3040
College Station, TX 77841-3040
Phone: (979) 845-3414
Toll Free: (888) 646-5623
Fax: (979) 845-1794
http://tvmdl.tamu.edu

USDA-APHIS-VS-NVSL
P.O. Box 844 (letters)
1920 Dayton Ave. (packages)
Ames, IA 50010
Phone: (515) 337-7266
Fax: (515) 337-7397
http://www.aphis.usda.gov/animal_health/lab_info_services/

Treatment: Generally no treatment is performed because animal are often asymptomatic for infection or found dead. Supportive care for cardiac failure can be provided in less than acute cases.

Prevention and control: Consistent and long term rodent control and prevention of rodent access to animal enclosures and food sources is critical for prevention. Hygienic feeding practices are important. If rodent feces are detected, increase rodent control measures and change feeding practices such as not leaving food bowls available overnight. Enclosure surfaces and food bowls should be cleaned with appropriate disinfectants. In enclosures with heavy contamination of rodent feces, removal of soil and substrate should be considered.

Commercial vaccines are not available in the US. Vaccine research is ongoing and recent trials have shown some promise in producing antibodies in tested species. However, USDA allows the production and use of autogenous product from an affected institution’s viral isolates at that institution only. To discuss this possibility, available contact is: Dr. Mark Titus, Newport Laboratories, Worthington, MN 56187, (800) 220 2522, direct phone: 507-372-3563, www.newportlabs.com, mtitus@newportlabs.com.

Suggested disinfectant for housing facilities: 5.25% sodium hypochlorite or household bleach at 3% dilution can be used by adding 3 gallons bleach to 2 gallons water and mixing thoroughly. This combination can be corrosive and damage clothing. Potassium peroxymonosulfate and sodium chloride (Virkon-S) - 1% dilution, Follow label directions. Sodium carbonate (soda ash) – 4% dilution, Add 5.33oz sodium carbonate to 1 gallon hot water (mildly caustic).

Notification: None
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**Measures required under the Animal Disease Surveillance Plan:** None

**Measures required for introducing animals to infected animal:** None

**Conditions for restoring disease-free status after an outbreak:** Remove all evidence of rodent feces in the environment, clean the affected animal’s living spaces with an approved disinfectant (see above), increase rodent control, re-evaluate animal feeding strategies. A zoo collection animal (non-rodent species) that recovers from disease is not considered a carrier.

**Experts who may be consulted:**
Kay Backues, DVM  
Director of Animal Health  
Tulsa Zoo  
5701 East 36th Street N  
Tulsa, Oklahoma 74115  
Phone: (918) 669-6243  
Fax: (918) 669-6888  
kbackues@tulsazoo.org

**References**