<table>
<thead>
<tr>
<th>Animal Group(s) Affected</th>
<th>Transmission</th>
<th>Clinical Signs</th>
<th>Severity</th>
<th>Treatment</th>
<th>Prevention and Control</th>
<th>Zoonotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mice, rats</td>
<td>In mice, urine, vertical transmission; in mice/rats, tears, saliva</td>
<td>None in natural infections; immune, reproductive, and hematopoietic effects when experimentally inoculated in mice</td>
<td>Usually subclinical</td>
<td>Depopulation and restocking with MCMV-free animals</td>
<td>Isolate wild individuals from laboratory colonies</td>
<td>No</td>
</tr>
<tr>
<td>Guinea pig</td>
<td>Saliva, urine, vertical</td>
<td>Pneumonia, fetal death; neonatal runting, neurologic deficits, deafness</td>
<td>Subclinical to severe</td>
<td>None effective</td>
<td>Separate infected from GpCMV-free</td>
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<tr>
<td>Swine</td>
<td>Ocular/nasal discharges, urine, cervical fluids</td>
<td>Abortion, neonatal piglet losses, runting, poor weight gain, inclusion body rhinitis, pneumonia</td>
<td>Subclinical when &gt;3 wks old</td>
<td>Aantibiotics for secondary bacterial invaders</td>
<td>“All-in-all-out” farrowing and weaning management</td>
<td></td>
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<tr>
<td>Cattle</td>
<td>Possibly milk; not well documented</td>
<td>Rare to absent. Possible abortion; respiratory/genital diseases produced experimentally only</td>
<td>Subclinical</td>
<td>None</td>
<td>None needed</td>
<td></td>
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<tr>
<td>Horses</td>
<td>Probably respiratory secretions</td>
<td>Immunosuppression; corneal ulcers; pharyngitis; lymphadenopathy; fever in foals.</td>
<td>Subclinical to moderate, possible foal death</td>
<td>Symptomatic</td>
<td>None</td>
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<tr>
<td>Non-human primates</td>
<td>Bodily secretions</td>
<td>SIV-infected macaques similar to HIV infected humans; necro-</td>
<td>Majority subclinical</td>
<td>Symptomatic</td>
<td>Screen prior to introduction if necessary</td>
<td></td>
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</tbody>
</table>
## CYTOMEGALOVIRUS (CMV)

<table>
<thead>
<tr>
<th>Susceptible animal groups</th>
<th>Causative organism</th>
<th>Zoonotic potential</th>
<th>Distribution</th>
<th>Incubation period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodents, swine, cattle, non-human and human primates, some other mammals, some marsupials, some passerine birds.</td>
<td>Family <em>Herpesviridae</em>, Subfamily <em>Betaherpesvirinae</em>, except in cattle and horses, where it is <em>Gammaherpesvirinae</em>.</td>
<td>Although the virus has a restricted host range, interspecies transmission does occur in non-human primates. No natural transmission to humans from other species documented.</td>
<td>Rodents: The virus is widespread through reservoirs in wild populations. Specifically in guinea pigs, the virus is common in pets and laboratory populations but its distribution in the wild is unknown. Swine: Worldwide, with &gt;90% herd prevalence in North America, Europe, and Japan. Cattle: Worldwide. Equine: Widespread. Non-human primates: Widespread. Humans: 85% of population worldwide and in US, 50-85% adults are infected by age 40. If infection is acquired by mother during pregnancy, then up to 20% neonates severely affected. Finches: reported mostly in Europe.</td>
<td>Unknown in most species. Swine: 10-20 days. Humans: 3-12 weeks. Lifelong latent infection occurs commonly, may produce periodic episodes of reactivation, viral replication and shedding.</td>
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</tbody>
</table>
**Clinical signs:** In rats, mice, and squirrels, no clinical signs are presented in natural infections. Guinea pigs, however, present weight loss, ruffled coat, abortion, and neonatal abnormalities. Swine present signs of respiratory, neurologic, and reproductive systems. Cattle present no correlation between presence of virus and specific lesions. Horses present conjunctivitis, oculonasal discharge, and cough. In finches, affected birds present respiratory disease and death. Humans and non-human primates are usually subclinical. Immunocompromised non-human primates can present diarrhea, melena, dyspnea, and terminal opportunistic infection. In humans, severe permanent disabilities in children can occur when primary infection occurs during pregnancy, or when acquired in AIDS patients, organ transplant and cancer chemotherapy. These clinical signs range from malaise to permanent hearing loss, and include mental retardation; gastrointestinal, pulmonary, and auto-immune disease; and death.

**Post mortem, gross, or histologic findings:** Marked enlargement (6x normal) of nucleus and cytoplasm of infected cells (cytomegaly) is observed with large intranuclear (“owl's-eye”) and smaller basophilic intracytoplasmic inclusions. Affected organs by rodent species include: **mice:** submandibular salivary gland; **rats:** salivary/lacrimal glands; **European ground squirrels:** salivary gland; **guinea pigs:** salivary glands/renal tubules. **Swine:** macrophages in lungs, nasal mucosa, turbinates, and upper respiratory tract. **Sheep:** cytomegaly with virus has been detected in lung tissue of lamb with *Mycoplasma pneumoniae*. **Cattle:** monocytes/macrophages in multiple organ sites. **Horses:** leukocytes and respiratory tract and, kidneys. **Non-human primates:** inclusion bodies in alveolar septa and septal lining, liver, CNS, spleen, kidney, testes; meningoencephalitis, necrotizing vasculitis; neutrophilic infiltrates may be prominent in CNS and gastrointestinal tract. Several other species (e.g. hamster, chimpanzee, and gorilla) have been diagnosed based on characteristic cytomegaly in the absence of virus isolation.

**Diagnosis:** Virus isolation from bodily fluids, macrophages, or affected tissues can be performed. Horses can have nasal swabs submitted. Serologic or molecular testing options (ELISA, IFA, PCR) are available.

**Material required for laboratory analysis:** Tissues and bodily fluids for virus isolation include biopsies or post-mortem samples, or urine, cervical secretions, semen, saliva, lung lavage, or blood.

**Relevant diagnostic laboratories:**
- Pathogen Detection Laboratory
  California National Primate Research Center
  University of California
  Road 98 & Hutchison,
  Davis, California 95616
  (530) 752-8242
  Fax: (530) 752-4816
  PDL@primate.ucdavis.edu
  http://pdl.primate.ucdavis.edu/
- VRL Laboratories-San Antonio
  P.O. Box 40100
  7540 Louis Pasteur, Suite 200
  San Antonio, Texas 78229
  877-615-7275
  Fax: 210-615-7771
  http://www.vrlsat.com/
**CYTOMEGALOVIRUS (CMV)**

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9811 Owensmouth Avenue, Suite 4
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818-717-8880
Fax: 818-717-8881
info@zoologix.com
www.zoologix.com

**Treatment:** Most species are recommended to receive symptomatic treatment. If severely debilitated from disease, cull may be recommended and entire groups can be depopulated if virus will interfere with laboratory studies.

In humans, several weeks course of intravenous antivirals (e.g., ganciclovir or Foscarnet) are administered and treatment is usually lifelong for AIDS patients.

**Prevention and control:** Separate wild from captive populations to minimize transmission. Test individuals prior to introduction if applicable. All-in-all-out in production facilities used with all individuals moved out as a group and premises disinfected thoroughly between groups.

In humans, blood and blood-product transfusions should be limited and CMV-seronegative donors selected. High-titer CMV immunoglobulins may be prophylactic for bone marrow or renal transplant recipients.

**Suggested disinfectant for housing facilities:** Disinfectants or detergents should be utilized that are effective against herpesviruses.

**Notification:** None

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

**Measures required for introducing animals to infected animal:** Do not introduce infected animal to pregnant or immunocompromised individuals, or to group-housed research animals.

**Conditions for restoring disease-free status after an outbreak:** Disinfect environment, depopulate and restock with CMV-free animals

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**References:**