**MEASLES**

**Animal Group(s) Affected**: Primates, including humans; especially susceptible are colobus monkeys, macaques, and callitrichids

**Transmission**: Aerosol

**Clinical Signs**: Fever, conjunctivitis, cough, and characteristic rash. Other signs of encephalitis and gastroenteritis/colitis.

**Severity**: Highly contagious with variable morbidity and mortality.

**Treatment**: None aside from symptomatic care.

**Prevention and Control**: Proper quarantine of animals; wearing proper protective equipment, especially when known exposure to disease. Vaccination can be considered for non-human primates.

**Zoonotic**: Yes

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**Sheet completed on**: 29 January 2011; updated 10 September 2013

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**Susceptible animal groups**: All primates – human and non-human, although humans are the only known reservoir, are affected; in humans, usually young children or immunocompromised adults infected. Non-human primates are susceptible with variable morbidity and mortality that is species specific and affected by individual animal health status. With some non-human primate species, only seroconversion occurs.

**Causative organism**: Measles: paramyxoviridae-morbillivirus (also known as rubeola). It is an enveloped, single stranded RNA virus.

**Zoonotic potential**: Yes

**Distribution**: Worldwide, but now it is considered a foreign disease in the US as it was eliminated in 2000. Despite this status, a number of outbreaks occur each year, usually secondary to travel abroad and then spread due to lack of vaccination in groups of children.

**Incubation period**: Infectious 5-21 d post exposure.

**Clinical signs**: Disease is often asymptomatic. When clinical signs are present, they resemble influenza such as nasal and ocular discharge, and conjunctivitis. Diarrhea may be present, especially in New World monkeys. Occasionally, dermatitis is present, and rarely Koplick spots or stomatitis. Facial edema, blepharitis and erythema have been documented. Measles is immunosuppressive, therefore other diseases may confound diagnosis. Encephalitis, although rare, occurs acutely and has a rapid clinical course. Rarely further in macaques, abortion can be observed.

**Post mortem, gross, or histologic findings**: Exanthematous rash is noted grossly. In callitrichids, gastritis and enterocolitis is observed. Evidence of encephalitis is observed with acute measles. Syncytial cell formation and giant cell pneumonia is observed histologically. In macaques that abort, endometritis can be rarely observed.
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**Diagnosis:** Serology IgM and IgG (paired titers with 4 fold increase in IgG titer or if IgM is found), immunofluorescence (urine), viral isolation.

**Material required for laboratory analysis:** Serum is preferred (frozen or fresh), although plasma is accepted at some labs. Tissue samples—see specific labs for their requirements—are usually oropharyngeal swabs, nasal lavage, or urine.

**Relevant diagnostic laboratories:** PCR and ELISA testing on varying sample types (contact each group for their requirements) can be done at the following facilities.

- **Centers for Disease Control and Prevention Measles Virus Laboratory**
  DASH #81 Att: Dr. Bellini
  1600 Clifton Road
  Atlanta, Georgia 30333
  404-639-1156 or 404-639-3512
  Fax: 404-639-4187
  jrota@cdc.gov

- **VRL—San Antonio**
  P.O. Box 40100
  7540 Louis Pasteur, Suite 200
  San Antonio, Texas 78229
  877-615-7275
  Fax: 210-615-7771

- **Primate Diagnostic Services Laboratory (PDSL)**
  Washington National Primate Research Center
  University of Washington
  Seattle Washington 98195-7330
  diagnostic@wanprc.org

- **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

- **Zoologix Inc.**
  9811 Owensmouth Avenue, Suite 4
  Chatsworth California 91311-3800
  818-717-8880
  Fax: 818-717-8881
  info@zoologix.com
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**Treatment:** Supportive or symptomatic care, as no specific treatments are available.

**Prevention and control:** Vaccination has minimum age for humans of 1 year and booster is recommended to booster at least 4 weeks later although can be administered up to 4-6 years after the initial vaccinations (See http://www.cdc.gov/vaccines/recs/schedules/child-schedule.htm#hcp). Vaccination in gorillas has shown positive serologic responses. Colobus have been vaccinated without adverse effects per SSP veterinary advisor reports. Vaccination against canine distemper virus in macaques has shown effective protection against measles. Human handlers should be properly vaccinated against disease. According to human guidelines set by the CDC, pregnant women should not be vaccinated with MMR*; however, this concern is based on miscarriage or premature birth occurring in women with actual disease (http://www.cdc.gov/vaccines/pubs/preg-guide.htm).

*Note: monovalent measles vaccine is no longer available in the US so can only be obtained in polyvalent combinations, particularly MMR (Measles, Mumps, & Rubella).

**Suggested disinfectant for housing facilities:** Short lived virus, so routine disinfection is usually sufficient.

**Notification:** While this disease is not notifiable in animals, it is a human reportable disease.

**Measures required under the Animal Disease Surveillance Plan:** While this disease is not notifiable in animals, it is a human reportable disease.

**Measures required for introducing animals to infected animal:** Once exposed, the animal has a natural immunity and will not become re-infected. Typically, primates contract disease from human handlers.

**Conditions for restoring disease-free status after an outbreak:** The disease has a rapid spread and short course with no animal reservoirs.

**Experts who may be consulted:**
Centers for Disease Control and Prevention
1600 Clifton Rd
Atlanta, GA 30333
1-800-CDC-INFO (800-232-4636)

**References:**

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