

# Measles

## (Rubeola, red or hard measles)

- Organism:** RNA virus with 1 serotype, a member of the genus *Morbillivirus* and the Paramyxovirus family.
- Incubation period:** The incubation period of measles, from exposure to prodrome averages 10–12 days. From exposure to rash onset averages 14 days (range, 7–18 days).
- Infectious period:** From 1 day before the beginning of the prodromal period, (which is about **4 days before the rash appears**), **until 4 days** after the appearance of the rash; minimal after the second day of the rash.
- Transmission route:** Airborne by direct droplet spread, direct contact with nasal or throat secretions of infected persons; less commonly by articles freshly soiled with nose and throat secretions. Measles is one of the most highly communicable infectious diseases.
- Treatment:** Comfort measures. Exclude from childcare, school, work for 4 days prior to rash until 4 days after onset of rash.

### Information Needed for the Investigation

- **Verify the Diagnosis:** Is there a history of prodromal symptoms: temperature of 101°F or higher, Cough, Coryza, Conjunctivitis, and an erythematous maculopapular rash lasting 3 days or more? Are there small spots with white or bluish white centers on an erythematous base on the buccal mucosa (Koplik spots)?
  
- **Determine the Extent of Illness**
  - Request a digital photo of the rash.
  - Determine immunization status, recent travel, or other sites of potential exposure.
  - Develop a line list of close contacts and their immunization status.
  - Check if patient attends school, childcare, work, and has participated in other social activities. Instruct to stay home until 5<sup>th</sup> day after rash onset.
  - Notify the Regional Nurse Manager, the local Public Health Nurse, healthcare provider, or infection preventionist (IP) and the Immunization Program Manager.

### Laboratory Testing

Laboratory confirmation is essential for all outbreaks and all sporadic measles cases.

**Polymerase chain reaction (PCR)** is the preferred testing method for measles, and it is available through commercial reference laboratories including [LabCorp](#), [Quest](#), and [Mayo Reference Laboratories](#), as well as through the Alaska State Virology Laboratory (ASVL) in Fairbanks (routed to CA VDRL reference lab). Measles IgM testing is frequently falsely-positive and is not preferred. See below for [specific testing guidance](#).

## Specimen Collection

### Measles Specimen Collection, Storage, Transportation, and Shipment

Testing Method	Sample Type	Storage and Transport	Expected Turnaround Time
PCR*†±	Throat/NP swab** Urine**	<ul style="list-style-type: none"> <li>Store all specimens at 4°C.</li> <li>Ship inoculated viral transport media (VTM) or universal transport media (UTM) and/or urine to ASVL on cool packs (4°C) by an expedited delivery method.</li> </ul>	3 days
Serologic††	Collect 7-10 mL of blood in SST (serum separator tubes – tiger top, marble top, or yellow top without additives; 1 mL minimum	<ul style="list-style-type: none"> <li>Centrifuge tube to separate serum.</li> <li>Store specimen at 4°C and ship on cool packs.</li> </ul>	2-3 days

\*Only patients with symptoms consistent with measles will be considered for PCR testing.

†PCR is the preferred method for confirming an acute case.

\*\*Collection of both a respiratory swab and urine within 2 weeks of rash onset improves the odds of detecting viral RNA.

± Sequencing will be performed on PCR-positive specimens to determine viral genome.

†† Serologic testing may only be performed in conjunction with PCR sample testing from suspected measles cases.

- For patients presenting  $\leq 7$  days of rash onset:
  - Collect Throat or Nasopharyngeal (NP) Swab Specimen
    - Use a sterile synthetic swab (e.g. Dacron)
      - **Throat swab:** vigorously swab tonsillar areas and posterior nasopharynx with sterile Dacron swab.
      - **NP swab:** firmly rub nasopharyngeal passage with sterile Dacron swab.
    - Place swab into universal transport media (UTM)
  - Collect 7-10 mL of blood in SST (serum separator tubes – tiger top, marble top, or yellow top without additives; 1 mL minimum. Centrifuge to separate serum.
- For patient presenting  $> 7$  days after rash onset:
  - Collection of both a respiratory (throat or NP swab specimen, as described above) *and* urine within 2 weeks of rash onset improves the odds of detecting viral RNA.
    - **Urine:** 50-100 mL urine in a clean/sterile leak-proof container, not UTM. Collect from the first part of the urine stream. The first morning void is ideal.
  - Collect 7-10 mL of blood in SST (serum separator tubes – tiger top, marble top, or yellow top without additives; 1 mL minimum. Centrifuge to separate serum.

ASVL lab requisition slip: <https://health.alaska.gov/dph/Labs/Documents/publications/Virologytestreq.pdf>

Specimens should be shipped on cold packs within 24 hours as a Biological Substance Category B (UN3373). If shipping is delayed, freeze at -70°C and ship frozen.

### Contact and Control Measures

- Contacts born before 1957 are considered immune by disease.

- **Isolate** suspect 4 days prior to rash until 4 days after onset of rash and susceptible contacts on day 5-21 post-exposure.
- Vaccinate those persons who are unvaccinated with 2 doses of MMR, 4 weeks apart. If given within 72 hours of exposure, measles vaccine can provide protection or disease modification in some cases.
- Pregnant women and immunocompromised individuals who have been exposed need to be referred to their healthcare provider.
- Immune Globulin (Human) may be used within 6 days of exposure for susceptible household or other high- risk individuals (such as those < 12 months old).
  - NOTE: For most persons  $\geq$  12 months who are exposed to measles, use of MMR or measles vaccine within 72 hours of exposure is preferred to using immune globulin (except pregnant women and others for whom the vaccine is contraindicated). Any person exposed to measles who lacks evidence of measles immunity and to whom immune globulin (IG) is administered should subsequently receive MMR vaccine but not earlier than 3 months after IG administration (provided the vaccine is not contraindicated).
  - Some Immune Globulin (Human) IG is available at the SOE Depot. Package insert is available at: <https://www.fda.gov/media/86789/download>. *Note: The American Academy of Pediatrics Committee on Infectious recommends that the dose of IGIM should be 0.50 mL/kg (the maximum dose by volume is 15mL).*
  - [Immune Globulin Dosage for Measles Exposure \(CA DPH resource\)](#)

#### **Hospital Considerations:** [CDC Measles Infection Prevention and Control](#)

- Airborne Precautions for 4 days after the onset of rash or duration of illness in immunocompromised patients.
- Susceptible Health Care Workers (HCWs) should not enter the room if immune HCWs are available.
- No recommendation is available for personal protective equipment (i.e., masks) considered effective in protecting susceptible HCWs.
- See contact and control measures above for vaccination recommendations and use of IG.
- Exclude susceptible and exposed HCWs from duty starting on day 5 after first exposure to day 21 after last exposure, regardless of post exposure vaccine.

#### **Reporting Requirements**

- For confirmed cases, notify to CDC Measles SME's within 24 hours of confirmation.
- PHN or EPI nurse completes the [Measles Contact Investigation Worksheet](#) and the CDC Measles Surveillance Worksheet available at: <http://www.cdc.gov/vaccines/pubs/surv-manual/appx/appendix08-2-mea-wrsht.pdf>
- FTR: write up all confirmed cases.
- NBS: enter all suspect, probable and confirmed cases.
- Likely suspect measles cases (i.e., consider travel history, vax status, clinical presentation) should be reported promptly (within 24 hours) to the CDC by e-mail: [measlesreport@cdc.gov](mailto:measlesreport@cdc.gov).

#### **Resources**

- [VPD Surveillance Manual, Measles, Chapter 7](#)
- Epidemiology and Prevention of Vaccine-Preventable Diseases "Pink Book", Measles, Chapter 13. <https://www.cdc.gov/vaccines/pubs/pinkbook/meas.html>
- [CDC Measles Homepage](#)

- [CA DPH Measles Investigation Quicksheet](#) (helpful tables about Recommended follow-up for Contacts)