

Rubella (German measles, 3 Day Measles)

Organism: Togavirus of the genus *Rubivirus*. Rubella is dangerous because of its ability to damage an unborn baby, causing congenital rubella syndrome (CRS), which may include: deafness, cataracts, heart defects, liver and spleen damage and mental retardation.

Incubation period: 12 to 23 days.

Infectious period: 7 days before and 7 days after the onset of the rash. Infants born with CRS should be considered contagious until they are at least 1 year old, unless two consecutive clinical specimens obtained at least 1 month apart after the child is 3 months old are negative for rubella virus.

Transmission route: Respiratory via direct droplet contact from inhalation of nasopharyngeal secretions. Fomite transmission is possible from touching tissues or sharing drinking glass, cup, bottle used by someone with rubella.

Treatment: Supportive.

Information Needed for the Investigation

Verify the Diagnosis

- Symptoms are often mild, and up to 50% of infections may be subclinical. In children, rash is usually the first manifestation and a prodrome is rare. In older children and adults, there is often a 1 to 5 day prodrome with low-grade fever, malaise, lymphadenopathy, and upper respiratory symptoms preceding the rash. The rash of rubella is maculopapular and occurs 14 to 17 days after exposure. The rash usually occurs initially on the face and then progresses from head to foot. It lasts about 3 days and is occasionally pruritic. The rash is fainter than measles rash and does not coalesce. Lymphadenopathy may begin a week before the rash and last several weeks. Postauricular, posterior cervical, and suboccipital nodes are commonly involved. Arthralgia and arthritis occur frequently in adults.

Determine the Extent of Illness

- Request a digital photo of the rash.
- Determine immunization status, recent travel, and 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 patient to stay home for seven days after onset of rash.
- Contact the Regional Nurse Manager, the local Public Health Nurse, healthcare provider, Infection Preventionist (IP) and the Immunization Program Manager.

Laboratory Specimens

Rubella PCR is the method of choice for rapid clinical diagnosis at Alaska State Virology Laboratory (ASVL).

Swabs: use synthetic material swabs only – cotton or calcium-alginate tips and wooden or metal shafts are not acceptable.

Throat or nasopharyngeal swabs are the preferred specimens. Specimens should be collected using a Dacron® or other synthetic swab on a plastic shaft and placed in a tube containing universal transport media (UTM). ASVL will ship specimens by overnight service to a CDC contract lab in California for PCR testing. ASVL does not perform IgM antibody testing. IgG antibody testing for immunity is available at ASVL (Table 1).

- Specimens should be submitted (on cool packs) to Alaska State Virology Laboratory (ASVL) as soon as possible. ASVL will send these specimens to a CDC contract lab for PCR testing.

Laboratory Request Forms

1. ASVL laboratory request form:
<http://www.dhss.alaska.gov/dph/Labs/Documents/publications/FbxSupplyReq.pdf>
Complete the patient and submitter information. In the Miscellaneous Viral Serology area, select Rubella, check patient is symptomatic. In the remarks box, write PCR testing.
- For quicker turnaround time, ASVL may pre-approve shipping the specimen directly to the CDC Contract laboratory. Complete the [VRDL General Purpose Specimen Submittal Form](#) for the California Department of Public Health/VPD Reference Center Lab to include with the specimen. SOE will coordinate overnight shipping with the local Public Health Nurse.

Shipping Options

- Mail:
Alaska State Viral Laboratory P.O. Box 60230 Fairbanks, AK 99706-0230
- Goldstreak to ASVL in Fairbanks:
Contact SOE at 269-8000 or ASVL 371-1000 to advise of flight information and air bill number. A courier will pick up the specimen and deliver to ASVL.
- Overnight delivery to the CDC Contract laboratory (**this must be pre-approved and coordinated with SOE and ASVL**) via FedEx Next Day Air. SOE/ASVL will provide the FedEx account number to charge for the shipment. (Please Note: Do not schedule shipments on Friday for weekend delivery as the reference lab is not open on the weekends and cannot accept the delivery.)
 - Fax a copy of the completed (VPD) submittal form and FedEx shipping label to the California Department of Public Health Lab at **(510) 307-8578**.

- Fax the ASVL laboratory request form and VPD submittal form to ASVL at (907) 474-4036.
- Be sure to place a copy of the completed (VPD) submittal form from the California Department of Public Health in the box that will be shipped via FedEx.

Ship to: California Department of Public Health
 Marina Bay Parkway
 Richmond, CA 94804
 ATTN: Specimen Receiving
 Phone: (510) 307-8585

Clinical specimens should be properly packaged and shipped on **cold** packs as Biological Substance Category B (UN 3373).

Table 1. Specimens for rubella testing submitted to ASVL

Test	Rubella
Testing Lab	Alaska State Virology Laboratory - Fairbanks
Disease(s)	Rubella, German measles, Congenital Rubella Syndrome.
Organism(s)	Rubella Virus
Test Method	Serology (Rubella IgG Antibody) <ol style="list-style-type: none"> 1. This test is used to determine immune status. 2. The test is performed at ASVL by EIA. PCR (Rubella Virus Nucleic Acid) <ol style="list-style-type: none"> 1. This test is used to determine active infection. 2. Testing will be performed at a CDC contract lab.
Specimen	Serology <ul style="list-style-type: none"> • Centrifuged serum in SST (serum separator tubes – tiger top, marble top or yellow top without additives) PCR <ol style="list-style-type: none"> 1. Throat Swab (TS) 2. Nasopharyngeal Swab (NP) <i>(Swabs: use synthetic material swabs only – cotton or calcium-alginate tips and wooden or metal shafts are not acceptable)</i>
Storage/Transport	Serology <ul style="list-style-type: none"> • Store refrigerated or frozen; indicate date frozen (if applicable) on requisition • Ship on frozen packs (preferred) or cold packs • <i>Ambient temperature shipping is not optimal for testing</i> PCR <ol style="list-style-type: none"> 1. Ship inoculated UTM to ASVL on cool packs (4°C). 2. ASVL will overnight the sample to the CDC Contract Lab.
Results	Serology <ol style="list-style-type: none"> 1. <i>Negative:</i> No significant level of detectable antibody. Presumed to be susceptible to primary infection. 2. <i>Equivocal:</i> A borderline result. Result falls w/in $\pm 10\%$ of the positive threshold. Resubmission may be indicated. 3. <i>Positive:</i> Indicates immunity by vaccination or infection. PCR <ol style="list-style-type: none"> 1. Not Detected <ul style="list-style-type: none"> • Rubella Virus nucleic acid was not detected. 2. Detected <ul style="list-style-type: none"> • Rubella Virus nucleic acid was detected.
Turnaround Time	Serology: 7-10 days PCR: 2 days from date of receipt at CDC Contract Lab.

<http://www.dhss.alaska.gov/dph/Labs/Documents/LaboratoryTests.pdf>

Contact and Control Measures

- Exclude persons from school, work, and childcare for seven days after the onset of rash.

Hospital Considerations

- ISOLATION OF THE HOSPITALIZED PATIENT:

- In addition to standard precautions, for postnatal rubella, droplet precautions are recommended for 7 days after onset of the rash. Contact isolation is indicated for children with proven or suspected congenital rubella until they are at least 1 year of age, unless 2 cultures of clinical specimens obtained 1 month apart after 3 months of age are negative for rubella virus.
- Healthcare personnel without evidence of immunity who have been exposed to measles should be relieved from patient contact and excluded from the facility from the 5th day after the first exposure to the 21st day after the last exposure, regardless of whether they received vaccine or immune globulin (Ig) after the exposure. Susceptible Health Care Workers (HCWs) should not enter the room if immune care providers are available.
- No recommendation is available for personal protective equipment (i.e. masks) considered effective in protecting susceptible HCWs.

School and Child Care

- Children with postnatal rubella should be excluded from school or child care for 7 days after onset of the rash. During an outbreak, children without evidence of immunity should be immunized or excluded. Children with CRS should be considered contagious until they are at least 1 year of age, unless 2 cultures of clinical specimens obtained 1 month apart are negative for rubella virus after 3 months of age; infection-control precautions should be considered in children up to 3 years of age who are hospitalized for congenital cataract extraction. Caregivers of these infants should be made aware of the potential hazard of the infants to susceptible pregnant contacts.

Care of Pregnant Women

- When a pregnant woman is exposed to rubella, a blood specimen should be obtained as soon as possible and tested for rubella antibody. An aliquot of frozen serum should be stored for possible repeated testing at a later time. The presence of rubella-specific IgG antibody in a properly performed test at the time of exposure indicates that the person most likely is immune. If antibody is not detectable, a second blood specimen should be obtained 2 to 3 weeks later and tested concurrently with the first specimen. If the second test result is negative, another blood specimen should be obtained 6 weeks after the exposure and also tested concurrently with the first specimen; a negative test result in both the second and third specimens indicates that infection has not occurred, and a positive test result in the second or third specimen but not the first (seroconversion) indicates recent infection.

Immune Globulin

- Immune Globulin (IG) does not prevent rubella infection after exposure and is not recommended for that purpose. Although administration of IG after exposure to rubella will not prevent infection or viremia, it may modify or suppress symptoms and create an unwarranted sense of security. Therefore, IG is not recommended for routine postexposure prophylaxis of rubella in early pregnancy or any other circumstance. Infants with CRS have been born to women who received IG shortly after exposure. Administration of IG should be considered only if a pregnant woman who has been exposed to rubella will not consider termination of pregnancy under any circumstance. Administration of IG eliminates the value of IgG antibody testing to detect maternal infection.
 - The EPI depot has IG available

<http://www.talecris-pi.info/inserts/gamastans-d.pdf>

Vaccine

- Although live-virus rubella vaccine administered after exposure has not been demonstrated to prevent illness, vaccine theoretically could prevent illness if administered within 3 days of exposure. Immunization of exposed nonpregnant people may be indicated, because if the exposure did not result in infection, immunization will protect these people in the future. Immunization of a person who is incubating natural rubella or who already is immune is not associated with an increased risk of adverse effects.

Reporting Requirements

- FTR: write up outbreak cases.
- AK-STARS: enter all suspect, probable and confirmed cases.
- CDC Case Definition is used to define suspect, probable and confirmed cases.

Resource

Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Available at <http://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf>

The Manual for the Surveillance of Vaccine-Preventable Diseases (5th Edition 2012)
<http://www.cdc.gov/vaccines/pubs/surv-manual/index.html>

Red Book: Report of the Committee on Infectious Diseases-(29th Edition 2012)

Rubella (German measles)

2010 Case Definition CSTE Position Statement Number: 09-ID-55

Case classification

Suspected:

Any generalized rash illness of acute onset that does not meet the criteria for probable or confirmed rubella or any other illness

Probable:

In the absence of a more likely diagnosis, an illness characterized by all of the following:

- acute onset of generalized maculopapular rash; and
- temperature greater than 99.0° F or 37.2° C, if measured; and
- arthralgia, arthritis, lymphadenopathy, or conjunctivitis; and
- lack of epidemiologic linkage to a laboratory-confirmed case of rubella; and
- noncontributory or no serologic or virologic testing.

Confirmed:

- A case with or without symptoms who has laboratory evidence of rubella infection confirmed by one or more of the following laboratory tests:
 - isolation of rubella virus; or
 - detection of rubella-virus specific nucleic acid by polymerase chain reaction; or
 - significant rise between acute- and convalescent-phase titers in serum rubella immunoglobulin G antibody level by any standard serologic assay; or
 - positive serologic test for rubella immunoglobulin M (IgM) antibody;
- OR
- An illness characterized by all of the following:
 - acute onset of generalized maculopapular rash; and
 - temperature greater than 99.0°F or 37.2°C;
 - arthralgia, arthritis, lymphadenopathy, or conjunctivitis; and
 - epidemiologic linkage to a laboratory-confirmed case of rubella.

Epidemiologic Classification of Internationally-Imported and U.S.-Acquired

Internationally imported case: An internationally imported case is defined as a case in which rubella results from exposure to rubella virus outside the United States as evidenced by at least some of the exposure period (12–23 days before rash onset) occurring outside the United States and the onset of rash within 23 days of entering the United States and no known exposure to rubella in the U.S. during that time. All other cases are considered U.S.-acquired cases.

U.S.-acquired case: A U.S.-acquired case is defined as a case in which the patient had not been outside the United States during the 23 days before rash onset or was known to have been exposed to rubella within the United States.

U.S.-acquired cases are subclassified into four mutually exclusive groups:

Import-linked case: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.

Imported-virus case: a case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported rubella genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any rubella virus that occurs in an endemic chain of transmission (i.e., lasting ≥ 12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.

Endemic case: a case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of rubella virus transmission continuous for ≥ 12 months within the United States.

Unknown source case: a case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

Note: Internationally imported, import-linked, and imported-virus cases are considered collectively to be import-associated cases.

States may also choose to classify cases as "out-of-state-imported" when imported from another state in the United States. For national reporting, however, cases will be classified as either internationally imported or U.S.-acquired.

Comment

Serum rubella IgM test results that are false positives have been reported in persons with other viral infections (e.g., acute infection with Epstein-Barr virus [infectious mononucleosis], recent cytomegalovirus infection, and parvovirus infection) or in the presence of rheumatoid factor. Patients who have laboratory evidence of recent measles infection are excluded.

See also:

- [2009 case definition](#)
- [2007 case definition](#)
- [1996 case definition](#)
- [1990 case definition](#)

Rubella, Congenital Syndrome

2010 Case Definition

CSTE Position Statement Number: 09-ID-61

Case classification

Suspected: An infant that does not meet the criteria for a probable or confirmed case but who has one of more of the following clinical findings:

- ✚ cataracts or congenital glaucoma,
- ✚ congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis),
- ✚ hearing impairment,
- ✚ pigmentary retinopathy
- ✚ purpura,
- ✚ hepatosplenomegaly,
- ✚ jaundice,
- ✚ microcephaly,
- ✚ developmental delay,
- ✚ meningoencephalitis, or
- ✚ radiolucent bone disease.

Probable:* An infant without an alternative etiology that does not have laboratory confirmation of rubella infection but has at least 2 of the following:

cataracts or congenital glaucoma,*
congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis),
hearing impairment, or
pigmentary retinopathy;

OR

An infant without an alternative etiology that does not have laboratory confirmation of rubella infection but has at least one or more of the following:

cataracts or congenital glaucoma,*
congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis),
hearing impairment, or
pigmentary retinopathy

AND one or more of the following:

purpura,

hepatosplenomegaly,
jaundice,
microcephaly,
developmental delay,
meningoencephalitis, or
radiolucent bone disease.

Confirmed: An infant with at least one symptom (listed above) that is clinically consistent with congenital rubella syndrome; and laboratory evidence of congenital rubella infection as demonstrated by:

isolation of rubella virus, or
detection of rubella-specific immunoglobulin M (IgM) antibody, or
infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a twofold dilution per month), or
a specimen that is PCR positive for rubella virus.

Infection only: An infant without any clinical symptoms or signs but with laboratory evidence of infection as demonstrated by

isolation of rubella virus, or
detection of rubella-specific immunoglobulin M (IgM) antibody, or
infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a twofold dilution per month), or
a specimen that is PCR positive for rubella virus.

*In probable cases, either or both of the eye-related findings (cataracts and congenital glaucoma) count as a single complication. In cases classified as infection only, if any compatible signs or symptoms (e.g., hearing loss) are identified later, the case is reclassified as confirmed.

Epidemiologic Classification of Internationally-Imported and U.S.-Acquired

Congenital Rubella Syndrome (CRS) cases will be classified epidemiologically as internationally imported or U.S.-acquired, according to the source of infection in the mother, using the definitions below, which parallel the classifications for rubella cases.

Internationally imported case: To be classified as an internationally imported CRS case, the mother must have acquired rubella infection outside the U.S. or in the absence of documented rubella infection, the mother was outside the United States during the period when she may have had exposure to rubella that affected her pregnancy (from 21 days before conception and through the first 24 weeks of pregnancy).

U.S.-acquired case: A US-acquired case is one in which the mother acquired rubella from an exposure in the United States. U.S.-acquired cases are subclassified into four mutually exclusive groups:

Import-linked case: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.

Import-virus case: a case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported rubella genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any rubella virus that occurs in an endemic chain of transmission (i.e., lasting ≥ 12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.

Endemic case: a case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of rubella virus transmission continuous for ≥ 12 months within the United States.

Unknown source case: a case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

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See also:

[2007 Case Definition](#)

[1999 case definition](#)

[1996 case definition](#)

[1990 case definition](#)