

Overview

Useful For

Identifying measles infection using random urine specimens

Method Name

Real-Time Polymerase Chain Reaction (PCR)

NY State Available

Yes

Specimen

Specimen Type

Urine

Ordering Guidance

Polymerase chain reaction testing (this test) is recommended as the first-line test if a patient has symptoms of measles (ie, cough, fever, conjunctivitis, rash).

If serology has been performed and IgM-class antibodies against measles are detected (ROGM / [Measles \(Rubeola\) Virus Antibody, IgM and IgG, Serum](#)), this test should be ordered to confirm measles infection.

Shipping Instructions

Specimens must be shipped at refrigerated temperature. Specimens received frozen will be rejected.

Specimen Required

Supplies: Urine Tubes, 10 mL (T068)

Container/Tube: Plastic, 10-mL urine tube

Specimen Volume: 1 mL

Collection Instructions:

1. Collect a random urine specimen.
2. No preservative

Specimen Minimum Volume

0.3 mL

Reject Due To

| | |
|------------------------|--------|
| Samples that have been | Reject |
|------------------------|--------|

| | |
|---|--|
| heat inactivated Urine containing preservatives | |
|---|--|

Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---------------|--------------|--------|-------------------|
| Urine | Refrigerated | 7 days | |

Clinical & Interpretive

Clinical Information

Measles virus is a single-stranded, negative-sense RNA *paramyxovirus* belonging to the genus *Morbillivirus* that causes acute respiratory illness. Symptoms of infection include fever, malaise, cough, coryza, and conjunctivitis. Following the onset of symptoms, individuals typically develop a pathognomonic enanthema (Koplik spots) followed by a maculopapular rash. Measles virus is transmitted via inhalation of aerosols or respiratory droplets and is highly contagious. Measles virus can also be transmitted by direct contact with infected secretions or contaminated fomites. Laboratory confirmation of measles cases can be through serologic detection of measles-specific IgM antibodies or molecular detection of measles virus RNA. The use of reverse-transcription polymerase chain reaction can provide increased sensitivity and specificity compared to serologic testing if specimens are collected early after rash onset. Collection of both respiratory and urine samples for analysis is recommended to increase the likelihood of detecting the virus.

Reference Values

Negative

Interpretation

A positive result indicates the presence of measles virus RNA in the specimen.

Cautions

A negative test does not rule out infection with measles virus. Therefore, the results should be used in conjunction with clinical findings and serologic test results to make an accurate diagnosis.

The potential for false-negative results exists due to improper sample collection or viral variants.

Supportive Data

The following validation data support the use of this assay for clinical testing.

Accuracy:

Accuracy studies were performed by testing negative and positive (near the limit of detection) urine and upper respiratory swab samples. Urine yielded 88% positive agreement and 100% negative agreement with expected results.

Upper respiratory swabs yielded 100% positive and 100% negative agreement with expected results.

Analytical Sensitivity/Limit of Detection:

The lower limit of detection of this assay is 2 genome copies/mL for urine and 1 copy/mL for throat swabs.

Precision:

Inter-assay and intra-assay precisions were 100%.

Specificity:

No sequences were identified that would result in cross-reactivity with the assay by in silico analysis. No cross-reactivity was detected in experiments testing a panel of nucleic acid extracts from greater than 50 bacterial, fungal, and viral organisms causing similar disease or commonly found in urine or throat swabs.

Reportable Range:

This is a qualitative assay, and the results are reported as either "negative" or "positive" for the measles virus target.

Clinical Reference

1. Centers for Disease Control and Prevention (CDC) Measles (Rubeola): For Healthcare Providers. CDC. Updated November 5, 2020. Accessed September 7, 2022. Available at: www.cdc.gov/measles/hcp
2. Moss WJ. Measles. *Lancet*. 2017;390(10111):2490-2502.
3. Porter A, Goldfarb J. Measles: A dangerous vaccine-preventable disease returns. *Cleve Clin J Med*. 2019;86(6):393-398.

Performance

Method Description

The measles virus laboratory-developed reverse-transcription polymerase chain reaction (RT-PCR) assay is designed for the qualitative detection of measles virus RNA from urine and throat swabs of patients with suspected infection. Measles virus RNA in clinical specimens is first extracted using the NucliSENS easyMag/EMAG bioMérieux instruments according to manufacturer instructions. As a component of extraction, a lysis buffer is first added to clinical specimens in a class II biosafety cabinet (BSC). At this step, any measles virus that may be present in the sample is inactivated, rendering it non-infectious. Following the addition of lysis buffer, specimens are safe to remove from the BSC and placed onto an instrument for automated extraction. A sample input of 200 µL will be extracted with an elution volume of 50 µL.

This assay employs a reverse transcription reaction to convert RNA to complementary DNA. Oligonucleotide forward and reverse primers specific to the nucleoprotein (N) gene region of the measles virus amplify the target sequence. A TaqMan probe labeled with the fluorophore FAM and specific to the target region of measles virus RNA binds to amplified measles RNA virus product. Ribonuclease P (RNase P) is used as an internal control. Oligonucleotide forward and reverse primers specific to the p30 subunit of RNase P amplify the internal control target sequence. A TaqMan probe labeled with fluorophore Cy5 and specific to RNase P bind to the amplified RNase P product. The dye-labeled TaqMan probes allow for the detection of the target and internal control in the corresponding channels of the Roche

LightCycler 480 II (LC480) instrument. Detection of the target N gene region indicates the presence of measles virus RNA in the specimen. The clinical validity of RT-PCR for the detection of the N gene of measles virus RNA in urine and throat swabs is well documented in peer-reviewed literature. (Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

1 to 3 days

Specimen Retention Time

1 week

Performing Laboratory Location

Rochester

Fees & Codes**Fees**

- Authorized users can sign in to [Test Prices](#) for detailed fee information.
- Clients without access to Test Prices can contact [Customer Service](#) 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact [Customer Service](#).

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

87798

LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---------|--------------------------|--------------------|
| MEASU | Measles Virus PCR, Urine | 86577-4 |

| Result ID | Test Result Name | Result LOINC® Value |
|-----------|--------------------------|---------------------|
| 617822 | Measles Virus PCR, Urine | 86577-4 |