MAYO CLINIC LABORATORIES

Test Definition: MEASR

Measles Virus, Molecular Detection, PCR, Throat

Overview

Useful For
Identifying measles virus infection using throat swab specimens

Method Name
Real-Time Polymerase Chain Reaction (PCR)

NY State Available
Yes

Specimen

Specimen Type
Varies

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 should be transported as soon as possible.

Specimen Required
Specimen Type: Throat Swab
Supplies: Culturette (BBL Culture Swab) (T092)
Container/Tube: Sterile container with transport media
Specimen Volume: Entire collection
Collection Instructions:
1. Collect specimen by swabbing back and forth over mucosal surface to maximize recovery of cells.
2. Swab must be placed into viral transport media (eg, M4-RT, M4, M5, Bartels FlexTrans Transport Media, Jiangsu Transport Media)

Specimen Minimum Volume
0.3 mL

Reject Due To

E-swab, calcium alginate-tipped swab, wood swab, dry swab, or transport swab containing gel or charcoal additive	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Refrigerated (preferred)	7 days	
	Frozen	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/mcL for urine and 1 copy/mcL 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 Dec;390(10111):2490-2502
3. Porter A, Goldfarb J. Measles: a dangerous vaccine-preventable disease returns. Cleve Clin J Med. 2019 Jun;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 (bioMerieux) 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 present in the sample is inactivated, rendering it noninfectious. 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 mcL will be extracted with an elution volume of 50 mcL.

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
MEASR	Measles Virus PCR, Throat	91077-8

Result ID	Test Result Name	Result LOINC® Value

617821	Measles Virus PCR, Throat	91077-8