Test Definition: CMVLR

Cytomegalovirus (CMV) Molecular Detection, PCR, Lower Respiratory

Overview

Useful For

Rapid qualitative detection of cytomegalovirus (CMV) DNA in lower respiratory specimens

This test is **not intended** for the monitoring of CMV disease progression or response to therapy.

Method Name

Real-Time Polymerase Chain Reaction (PCR)/DNA Probe Hybridization

NY State Available

Yes

Specimen

Specimen Type

Varies

Ordering Guidance

For plasma specimens, order CMVQN / Cytomegalovirus (CMV) DNA Detection and Quantification by Real-Time PCR, Plasma.

Necessary Information

Specimen source is required.

Specimen Required

Specimen Type: Lower respiratory
Source: Bronchial washing, bronchoalveolar lavage, fluid/washings from lung, sputum, tracheal secretions, tracheal aspirates
Container/Tube:
Preferred: Sterile, screwcap, 5-mL aliquot tube
Acceptable: Sterile container
Specimen Volume: 1 mL
Collection Instructions: Do not centrifuge.

Specimen Minimum Volume

0.5 mL

Reject Due To

Lower	Reject

respiratory swab Calcium alginate-tipped swab Wood swab Transport swab containing gel Feces Paraffin blocks Tissue specimens Tissue biopsy Bronchial brushings Heat-inactivated specimens Lower respiratory in transport media	

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Refrigerated (preferred)	7 days	
	Frozen	7 days	

Clinical & Interpretive

Clinical Information

Cytomegalovirus (CMV) is a double-stranded DNA virus of the Herpesviridae family. CMV is transmitted through infected body fluids, as well as through sexual contact, organ transplantation, and intrauterine transmission during pregnancy. CMV infection may be asymptomatic but can cause a wide range of symptoms in immunocompromised individuals. Detection of CMV DNA in lower respiratory specimens may support the clinical diagnosis of CMV pneumonitis. Infection with CMV is a significant cause of morbidity and mortality in transplant recipients and other immunocompromised hosts.

Reference Values

Negative

Reference values apply to all ages.

Interpretation

A positive result indicates the presence of cytomegalovirus (CMV) DNA in the patient specimen.

A negative result indicates the absence of CMV DNA in the patient specimen but does not rule out possible infection with CMV.

An invalid result indicates the inability to conclusively determine presence or absence of CMV DNA in the patient specimen.

Cautions

This test is not validated for lung tissue or biopsy specimens; it is only validated for the lower respiratory specimens indicated in Specimen Required.

Negative results do not preclude cytomegalovirus (CMV) infection and should not be used as the sole basis for treatment or other patient management decisions.

False-negative results may occur if the viral nucleic acid is present at a level below the analytical sensitivity of the assay, if the virus has genomic mutations, insertions, deletions, or rearrangements, or if the assay is performed very early in the course of illness.

The performance of this test has not been established for monitoring treatment of CMV infection.

Supportive Data

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

Accuracy:
A total of 107 previously tested (n=78) and prospective (n=29) lower respiratory clinical specimens submitted to our reference laboratory for routine cytomegalovirus (CMV) real-time polymerase chain reaction (PCR) (CMVPV / Cytomegalovirus (CMV) Molecular Detection, PCR, Varies) were tested by this test.

The overall qualitative positive percent agreement was 96% (48/50). The overall qualitative negative percent agreement was 82% (47/57).

Additional CMV testing on 8 of the 12 discrepant specimens suggests these are true CMV positive specimens, which increased the overall percent agreement to 96% (103/107). Result discrepancies were notable for specimens retrospectively collected that were subjected to extended frozen storage prior to concurrent testing by routine CMV real-time PCR and the new CMV lower respiratory assay (Diasorin Simplexa CMV). Results suggest increased assay sensitivity over the routine CMV real-time PCR assay for lower respiratory specimens, especially for those undergoing extended frozen storage (< or =-70 degrees C).

Analytical Sensitivity/Limit of Detection:
To evaluate the analytical sensitivity, whole virus control (ZeptoMetrix) was spiked into residual analyte-negative lower respiratory fluid specimens between 0.1 and 1000 copies/mL and tested in six replicates per dilution. The lowest concentration detected in all six replicates was confirmed by spiking 20 unique residual analyte-negative lower

respiratory fluid specimens. A positive result was obtained in 19/20 (95%) replicates, and the analytical sensitivity (limit of detection) was determined to be 90 copies/mL.

Analytical Specificity:
The Simplexa Congenital CMV Direct assay is not US Food and Drug Administration-authorized for lower respiratory specimens. However, the kit instructions for use (Simplexa Congenital CMV Direct, IFUK.US.MOL2255, Rev. 01, 11/2022) indicate no cross-reactivity was observed with a panel of 41 organisms spiked into an upper-respiratory matrix. Inclusivity was confirmed with CMV strains AD-169, Merlin, Towne and Toledo. Additionally, in silico BLAST analysis demonstrated that the assay should detect at least 327 CMV sequences available in the NCBI database, including the 4 CMV genotypes gB1, gB2, gB3 and gB4.

Additionally, a panel of 7 organisms commonly found in the lower respiratory tract were tested by this method as part of this validation, and no was signal detected.

Clinical Reference

1. Caliendo, AM. Approach to the diagnosis of cytomegalovirus infection. UpToDate; Updated May 16, 2024. Accessed November 1, 2024. Available at www.uptodate.com/contents/approach-to-the-diagnosis-of-cytomegalovirus-infection
2. Fernholz EC, Vidal-Folch N, Hasadsri L. Rapid and direct detection of congenital cytomegalovirus using a commercial real-time PCR assay. J Clin Microbiol. 2023;61(3):e0178122. doi:10.1128/jcm.01781-22
3. Saksirisampant G, Kawamatawong T, Promsombat K, et al. A prospective study of plasma and bronchoalveolar lavage fluid CMV DNA load quantification for the diagnosis and outcome of CMV pneumonitis in immunocompromised hosts. J Clin Virol. 2022;155:105243. doi:10.1016/j.jcv.2022.105243
4. Setiabudi D, Sukur RR, Nugraha HG, Nataprawira HM. Cytomegalovirus pneumonitis in infants: The challenge in diagnosis among pediatricians. IDCases. 2023;32:e01724. doi:10.1016/j.idcr.2023.e01724
5. Prokop K, Schmitt B. Performance evaluation of a new CMV Direct PCR assay using urine, CSF and Bronchoalveolar lavage specimen types.ASM Clinical Virology Symposium. 09/11/2023

Performance

Method Description

The Simplexa Congenital CMV (cytomegalovirus) Direct assay is a real-time polymerase chain reaction (PCR) system that enables the direct amplification and detection of CMV DNA from lower respiratory specimens without nucleic acid extraction. The system consists of the Simplexa Congenital CMV Direct Reaction Mix, the LIAISON MDX (with LIAISON MDX Studio Software), the direct amplification disc, and associated accessories.

In the Simplexa Congenital CMV Direct assay, bifunctional fluorescent probe-primers are used together with corresponding reverse primers to amplify CMV DNA. A well-conserved region of the CMV UL83 gene is targeted to identify CMV DNA. An internal control is used to detect PCR failure or inhibition.(Package insert: Simplexa Congenital CMV Direct. Diasorin; REF MOL2255. Rev. 01, 11/2022)

PDF Report

No

Day(s) Performed
Monday through Sunday

Report Available
Same day/1 to 2 days

Specimen Retention Time
7 days

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

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
87496

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CMVLR	Cytomegalovirus, PCR, Lower Resp	104760-4

Result ID	Test Result Name	Result LOINC® Value
CMVSS	Specimen Source	31208-2
621771	CMVLR, PCR	104760-4