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Cytomegalovirus (CMV) End-Point PCR Kit — Product Insert

Product# EP36300

Intended Use

Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is designed for the detection of CMV specific DNA based on the use of end-point PCR technology. This kit is designed for research use only and not for use in diagnostic procedures.

Background Information

Cytomegalovirus (CMV) is a member of the Herpesviruses group. CMV is commonly known as HCMV in humans, or Human Herpesvirus 5 (HHV-5). CMV belongs to the *β-herpesvirinae* subfamily of *Herpesviridae,* while other herpesviruses fall into the subfamilies of *Alphaherpesvirinae* (including HSV 1 and 2 and varicella) or *Gammaherpesvirinae* (including Epstein-Barr virus). All herpes viruses share a characteristic ability to remain latent within the body over long periods of time. While CMV can be found in numerous body fluids including urine, saliva, breast milk, blood, tears, semen, and vaginal fluids, urine samples are generally used for congenital (CMV) infection screening due to high viruria observed in infected infants.

HCMV infection can be life threatening for patients who are immunocompromised (e.g. patients with HIV, organ transplant recipients, or infants). HCMV infection is more widespread in developing countries and in communities with lower socioeconomic status and represents the most significant viral cause of birth defects in industrialized countries.

Product Description

Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is designed for the detection of CMV specific DNA based on the use of end-point PCR technology. This kit is designed for research use only and not for use in diagnostic procedures. The kit includes Master Mix and primers for the specific amplification of a 306 bp region of the CMV genome, as well as a positive control and a negative control to confirm the integrity of the kit reagents. In addition, the kit contains loading dye and a DNA ladder to facilitate analysis of the results.

The detection of CMV specific DNA is based on end-point PCR technology, utilizing polymerase chain reaction (PCR) for the amplification of specific CMV DNA sequences. For analysis of the PCR data, the PCR reaction is loaded on an agarose DNA gel along with the provided DNA ladder for qualitative analysis.

Norgen's Cytomegalovirus (CMV) End-Point PCR Kit was developed and validated to be used with the following PCR instruments:

- Qiagen Rotor-Gene Q
- BioRad CFX96 Touch™ Real-Time PCR Detection System

Kit Components

Component	Product # EP36300 (24 preps)
MDx 2X PCR Master Mix	350 µL
CMV Primer Mix	70 µL
CMV Positive Control	50 µL
Nuclease-Free Water	1.25 mL
Loading Dye	100 µL
DNA Ladder	100 µL
Product Insert	1

Storage Conditions and Product Stability

- All kit components should be stored at -20°C upon arrival
- Repeated thawing and freezing (> 2 x) of the Master Mix and Positive Control should be avoided, as this may affect the performance of the assay. If the reagents are to be used only intermittently, they should be frozen in aliquots.
- All reagents can be stored for 1 year at -20°C without showing any reduction in performance.

Customer-Supplied Reagents and Equipment

- Appropriate End-point PCR Instrument
- DNA Purification Kit
    - The kit is compatible with all DNA purification kits that yield high quality, inhibitor-free DNA
    - **Recommended Purification Kit:** Norgen's Plasma/Serum DNA Purification Kits (Cat. 55500, 55100, 55600, 55800)
- Disposable powder-free gloves
- Benchtop microcentrifuge
- Micropipettors
- Sterile pipette tips with filters
- PCR tubes
- Vortex mixer
- Agarose gel electrophoresis apparatus
- UV transilluminator with suitable gel documentation system
- PCR reaction preparation station (Optional)

Quality Control

In accordance with Norgen's ISO 9001 and ISO 13485-certified Quality Management System, each lot of Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is tested against predetermined specifications to ensure consistent product quality.

Warnings and Precautions

- Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is intended for research purposes only. It is not intended for diagnostic use.
- Follow universal precautions. All specimens should be considered as potentially infectious and handled accordingly.
- Ensure that a suitable lab coat, disposable gloves and protective goggles are worn when handling specimens and kit reagents.
- Use sterile pipette tips with filters. Use proper pipetting techniques and maintain the same pipetting pattern throughout the procedure to ensure optimal and reproducible values.
- As contamination of specimens or reagents can produce erroneous results, it is essential to use aseptic techniques. Pipette and handle reagents carefully to avoid mixing of the samples.
- Do not use supplies and equipment across the dedicated areas of i) specimen extraction, ii) reaction set-up and iii) amplification/detection. No cross-movement should be allowed between the different areas. Personal protective equipment, such as laboratory coats and disposable gloves, should be area specific.
- Store and extract positive material (specimens, controls and amplicons) separately from all other reagents and add it to the reaction mix in a spatially separated facility.

- Dispose of unused kit reagents and specimens according to local, provincial or federal regulations.
- Do not substitute or mix reagents from different kit lots or from other manufacturers. Do not use components of the kit that have been stored for more than 1 year.
- The presence of PCR inhibitors may cause false negative or invalid results.
- Potential mutations within the target regions of the CMV genome covered by the primers in this kit may result in failure to detect the presence of the pathogen.
- Good laboratory practice is essential for the proper performance of this kit. Ensure that the purity of the kit and reactions is maintained at all times, and closely monitor all reagents for contamination. Do not use any reagents that appear to be contaminated.
- Ensure that appropriate specimen collection, transport, storage and processing techniques are followed for optimal performance of this test.

Instructions for Use

A. Sample Preparation

Purified DNA is the starting material for Norgen's Cytomegalovirus (CMV) End-Point PCR Kit. The quality of the DNA template will have a major impact on the performance of the CMV detection test. The user must ensure that the method used for DNA purification is compatible with end-point PCR. We recommend the use of Norgen's **Norgen's Plasma/Serum DNA Purification Kits (Cat. 55500, 55100, 55600, 55800).** Norgen's Plasma/Serum DNA Purification Kits has been fully validated with Norgen's CMV PCR Kit.

If using a different spin column based sample preparation procedure that includes ethanol-based wash buffers is used, a column drying step consisting of centrifugation for 3 minutes at 20,000 x g (~14,000 RPM), using a new collection tube, is highly recommended prior to the elution of the DNA. This will help to prevent the carry-over of any ethanol into the purified DNA, as ethanol is known to be a strong inhibitor of PCR. **Ensure that any traces of ethanol from the sample preparation steps are eliminated prior to the elution of the DNA.**

B. PCR Assay Preparation

Notes:

- Before use, suitable amounts of all PCR components should be completely thawed at room temperature, mixed by gentle vortexing or by pipetting, and centrifuged briefly.
- Work quickly on ice.
- The amount of MDX 2X PCR Master Mix provided is enough for up to 34 PCR reactions (24 sample PCR, 4 positive control PCR and 4 no template control PCR).
- For every PCR run, one reaction containing CMV Positive Control and one reaction as no template control must be included for proper interpretation of results.
- The recommended minimum number of DNA samples tested per PCR run is 6.
- To avoid any contamination while preparing the PCR assay, follow the order outlined in Tables 1, 2 and 3 below to prepare the Negative Control, Detection Assay and Positive Control:
    1. Prepare the PCR Negative Control (Table 1)
    2. Prepare the PCR CMV Assay (Table 2)
    3. Prepare the PCR Positive Control (Table 3)
- To further avoid contamination, add the components to the PCR tubes in the order shown in the tables below (ie: 1) Nuclease-free water; 2) Master Mix; 3) Primer Mix; and 4) the Sample DNA or Positive Control).

1. For each PCR set, prepare **one** no template control PCR as shown in Table 1 below:

Table 1. PCR Negative Control Preparation

PCR Components	Volume Per PCR Reaction
Nuclease-Free Water	8 µL
MDx 2X PCR Master Mix	10 µL
CMV Primer Mix	2 µL
Total Volume	20 µL

2. Prepare the PCR reaction for sample detection as shown in Table 2 below. The recommended amount of sample DNA to be used is 2.5 µL. However, a volume between 1 and 5 µL of sample DNA may be used as template. Adjust the final volume of the PCR reaction to 20 µL using the Nuclease-Free Water provided.

Table 2. PCR CMV Assay Preparation

PCR Components	Volume Per PCR Reaction
Nuclease-Free Water	5.5 µL
MDx 2X PCR Master Mix	10 µL
CMV Primer Mix	2 µL
Sample DNA	2.5 µL
Total Volume	20 µL

3. For each PCR set, prepare **one** positive control PCR as shown in Table 3 below:

Table 3. PCR Positive Control Preparation

PCR Components	Volume Per PCR Reaction
MDx 2X PCR Master Mix	10 µL
CMV Primer Mix	2 µL
CMV Positive Control (PosC)	8 µL
Total Volume	20 µL

C. CMV PCR Assay Programming

1. Program the thermocylcer according to the program shown in Table 4 below.
2. Run one step PCR.

Table 4. *CMV* Assay Program

PCR Cycle	Step	Temperature	Duration
Cycle 1	**Step 1**	**95°C**	**3 min**
Cycle 2 (40x)	**Step 1**	**94°C**	**15 sec**
	Step 2	**60°C**	**30 sec**
	Step 3	**72°C**	**45 sec**
Cycle 3	**Step 1**	**72°C**	**5 min**
Cycle 4	**Step 1**	**4°C**	**∞**

D. CMV PCR Assay Interpretation

- For the analysis of the PCR data, the entire 20 µL PCR reaction should be loaded on a 1X TAE 1.4 % Agarose DNA gel along with 10 µL of Norgen's DNA Ladder (provided).
- The PCR products should be resolved on the 1X TAE, 1.4 % Agarose gel at 150V for 30 minutes (Gel running time will vary depending on an electrophoresis apparatus).

Table 5. Interpretation of PCR Assay Results

Input Type	Target amplification		Interpretation
	CMV Target Band (306 bp)	**PCR control Band (150 bp)**	
Positive Control	Yes	Yes	Valid
Positive Control	Yes	No	Valid
Negative Control	No	Yes	Valid
Sample	Yes	Yes	Positive
Sample	No	Yes	Negative
Sample	No	No	PCR inhibition
Sample	Yes	No	Positive

For results obtained that are not covered in Table 5 above, please refer to the Frequently Asked Questions.

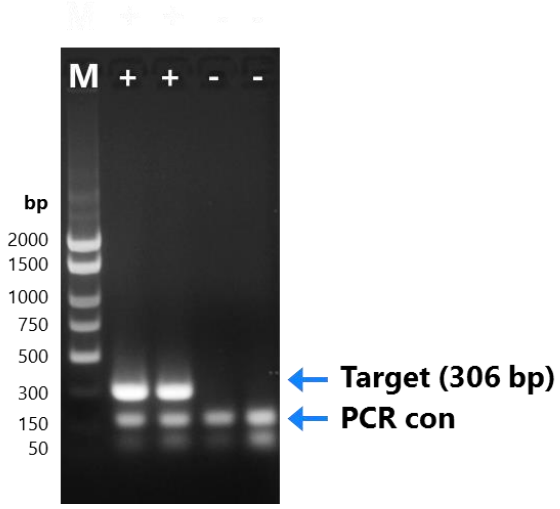

Figure 1: A representative 1X TAE, 1.4 % agarose gel showing the amplification of *CMV* at different concentrations. The size of the *CMV* target amplicon corresponds to the 306 bp band represented by the provided DNA Marker (M).

E. CMV PCR Assay Specificity

The specificity of Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is first and foremost ensured by the selection of the CMV-specific primers, as well as the selection of stringent reaction conditions. The CMV primers were checked for possible homologies to all human related viruses in GenBank published sequences by sequence comparison analysis.

Frequently Asked Questions

1. How many samples should be included per PCR run?

- Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is designed to test 24 samples. For every 6 samples, a non-template control (Nuclease Free Water) and a Positive Control must be included. It is preferable to collect and test 6 samples at a time.

2. How should it be interpreted if in negative control the CMV PCR control and the CMV target showed amplification in a sample?

- The assay has to be repeated. It could happen when there are carryover contamination.

3. How should it be interpreted if only the CMV target was amplified in a sample?

- The sample tested should be considered as CMV positive. At high CMV input, the CMV amplicon will be predominant and thus the CMV PCR control may not amplify as they compete for PCR resources.

Related Products	Product #
Cytomegalovirus (CMV) Primers and Control Set	EP36310
Plasma/Serum Cell-Free Circulating DNA Purification Micro Kit	55500
Plasma/Serum Cell-Free Circulating DNA Purification Mini Kit	55100
Plasma/Serum Cell-Free Circulating DNA Purification Midi Kit	55600
Plasma/Serum Cell-Free Circulating DNA Purification Maxi Kit	55800

Technical Support

Contact our Technical Support Team between the hours of 8:30 and 5:30 (Eastern Standard Time) at (905) 227-8848 or Toll Free at 1-866-667-4362.

Technical support can also be obtained from our website (www.norgenbiotek.com) or through email at techsupport@norgenbiotek.com.

Product Use Restriction

Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is designed for the detection of CMV specific DNA based on the use of end-point PCR technology. This kit is designed for research use only and not for use in diagnostic procedures.

Norgen's Cytomegalovirus (CMV) End-Point PCR Kit is intended for use by professional users such as technicians and biologists experienced and trained in molecular biological techniques including PCR.

Good laboratory practice is essential for the proper performance of this kit. Ensure that the purity of the kit and reactions is maintained at all times, and closely monitor all reagents for contamination. Do not use any reagents that appear to be contaminated.

Ensure that appropriate specimen collection, transport, storage and processing techniques are followed for optimal performance of this test.

The presence of PCR inhibitors may cause false negative or invalid results.

Potential mutations within the target regions of the CMV genome covered by the primers in this kit may result in failure to detect the presence of the pathogen.

The respective user is liable for any and all damages resulting from application of Norgen's Cytomegalovirus (CMV) End-Point PCR Kit for use deviating from the intended use as specified in the user manual.

All products sold by Norgen Biotek are subjected to extensive quality control procedures and are warranted to perform as described when used correctly. Any problems should be reported immediately. The kit contents are for laboratory use only, and they must be stored in the laboratory and must not be used for purposes other than intended. The kit contents are unfit for consumption.

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