ab108724
Anti-Cytomegalovirus (CMV) IgG
Human ELISA Kit

For the qualitative measurement of IgG class antibodies against Cytomegalovirus (CMV) in Human serum and plasma (citrate).

This product is for research use only and is not intended for diagnostic use.
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1. Overview

Abcam’s anti-Cytomegalovirus (CMV) IgG Human in vitro ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for the accurate qualitative measurement of IgG class antibodies against Cytomegalovirus in Human serum and plasma.

A 96-well plate has been precoated with Cytomegalovirus antigens to bind cognate antibodies. Controls or test samples are added to the wells and incubated. Following washing, a horseradish peroxidase (HRP) labelled anti-Human IgG conjugate is added to the wells, which binds to the immobilized Cytomegalovirus-specific antibodies. TMB is then catalyzed by the HRP to produce a blue color product that changes to yellow after adding an acidic stop solution. The density of yellow coloration is directly proportional to the amount of Cytomegalovirus IgG sample captured in plate.

Cytomegalovirus (CMV) is a member of the herpesvirus family (Beta subfamily, DNA virus of 150-200 nm). These viruses share a characteristic ability to remain dormant within the body over a long period. Initial CMV infection, which may have few symptoms, is always followed by a prolonged, subclinical infection during which the virus resides in cells without causing detectable damage or clinical illness. Severe impairment of the body’s immune system by medication or disease reactivates the virus from the latent or dormant state.

CMV is found throughout all geographic locations and socioeconomic groups, and infects between 50% and 85% of adults. CMV infection is more widespread in developing countries and in areas of lower socioeconomic conditions. For the vast majority of people, CMV infection is not a serious problem, but it is to certain high-risk groups:

- fetus during pregnancy
- people who work with children
- immunocompromised persons, such as organ transplant recipients and people infected with HIV
<table>
<thead>
<tr>
<th>Species</th>
<th>Disease</th>
<th>Symptoms</th>
<th>Mechanism of infection</th>
</tr>
</thead>
</table>
| Cytomegalovirus    | Cytomegaly (Cytomegalic inclusion disease or Inclusion body disease) | Mononucleosis-like syndrome  
Mild hepatitis  
Complications in infants resulting from congenital CMV disease: hearing and mental or coordination problems | Transmission from person to person: Infection requires close, intimate contact with a person shedding the virus in their saliva, urine, or other bodily fluids.  
CMV can be transmitted sexually, via breast milk, transplanted organs, and occasionally from blood transfusions |

The presence of viral respiratory infection may be identified by
- Microscopy
- PCR
- Serology: CBR, Detection of antibodies by ELISA
2. Protocol Summary

Prepare all reagents, samples and controls as instructed.

Add samples and controls to wells used. Incubate at 37ºC.

Wash each well and add prepared labeled HRP-Conjugate. Incubate at room temperature.

After washing, add TMB substrate solution to each well. Incubate at room temperature.

Add Stop Solution to each well. Read immediately.
3. Precautions

Please read these instructions carefully prior to beginning the assay.

- All kit components have been formulated and quality control tested to function successfully as a kit.
- We understand that, occasionally, experimental protocols might need to be modified to meet unique experimental circumstances. However, we cannot guarantee the performance of the product outside the conditions detailed in this protocol booklet.
- Reagents should be treated as possible mutagens and should be handled with care and disposed of properly. Please review the Safety Datasheet (SDS) provided with the product for information on the specific components.
- Observe good laboratory practices. Gloves, lab coat, and protective eyewear should always be worn. Never pipet by mouth. Do not eat, drink or smoke in the laboratory areas.
- All biological materials should be treated as potentially hazardous and handled as such. They should be disposed of in accordance with established safety procedures.

4. Storage and Stability

Store kit at +4°C immediately upon receipt. Kit has a storage time of 1 year from receipt, providing components have not been reconstituted.

Refer to list of materials supplied for storage conditions of individual components. Observe the storage conditions for individual prepared components in the Materials Supplied section.
5. Limitations

- Assay kit intended for research use only. Not for use in diagnostic procedures.
- Do not mix or substitute reagents or materials from other kit lots or vendors. Kits are QC tested as a set of components and performance cannot be guaranteed if utilized separately or substituted.

6. Materials Supplied

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
<th>Storage Condition (Before Preparation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cytomegalovirus antigens Coated Microplate (12 x 8 wells)</td>
<td>96 Wells</td>
<td>4°C</td>
</tr>
<tr>
<td>IgG Sample Diluent***</td>
<td>100 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>Stop Solution</td>
<td>15 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>20X Washing Solution*</td>
<td>50 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>Cytomegalovirus anti-IgG HRP Conjugate**</td>
<td>20 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>TMB Substrate Solution</td>
<td>15 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>Cytomegalovirus IgG Positive Control***</td>
<td>2 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>Cytomegalovirus IgG Cut-off Control***</td>
<td>3 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>Cytomegalovirus IgG Negative Control***</td>
<td>2 mL</td>
<td>4°C</td>
</tr>
<tr>
<td>Cover foil</td>
<td>1 unit</td>
<td>4°C</td>
</tr>
<tr>
<td>Strip holder</td>
<td>1 unit</td>
<td>4°C</td>
</tr>
</tbody>
</table>

* Contains 0.1 % Bronidox L after dilution
** Contains 0.2 % Bronidox L
*** Contains 0.1 % Kathon
7. Materials Required, Not Supplied

These materials are not included in the kit, but will be required to successfully perform this assay:

- Microplate reader capable of measuring absorbance at 450 nm or 620 nm
- Incubator at 37°C
- Multi and single channel pipettes to deliver volumes between 10 and 1,000 µL
- Optional: Automatic plate washer for rinsing wells
- Vortex tube mixer
- Deionised or (freshly) distilled water
- Disposable tubes
- Timer

8. Technical Hints

- Avoid foaming or bubbles when mixing or reconstituting components.
- Avoid cross contamination of samples or reagents by changing tips between sample, standard and reagent additions.
- Ensure plates are properly sealed or covered during incubation steps.
- Complete removal of all solutions and buffers during wash steps is necessary for accurate measurement readings.
- This kit is sold based on number of tests. A ‘test’ simply refers to a single assay well. The number of wells that contain sample, control or standard will vary by product. Review the protocol completely to confirm this kit meets your requirements. Please contact our Technical Support staff with any questions.
9. Reagent Preparation

- Equilibrate all reagents to room temperature (18-25°C) prior to use. The kit contains enough reagents for 96 wells.
- Prepare only as much reagent as is needed on the day of the experiment.

9.1 1X Washing Solution
Prepare 1X Washing Solution by diluting 20X Washing Solution with deionized water. To make 200 mL 1X Washing Solution combine 10 mL 20X Washing Solution with 190 mL deionized water. Mix thoroughly and gently.

All other solutions are supplied ready to use.
10. Sample Collection and Storage

- Use Human serum or plasma (citrate) samples with this assay. If the assay is performed within 5 days of sample collection, the specimen should be kept at 4°C; otherwise it should be aliquoted and stored deep-frozen (-20 to -80°C). If samples are stored frozen, mix thawed samples well before testing.
- Avoid repeated freezing and thawing.
- Heat inactivation of samples is not recommended.
11. Sample Preparation

- Before assaying, all samples should be diluted 1:100 with IgG Sample Diluent. Add 10 µL sample to 1 mL IgG Sample Diluent to obtain a 1:100 dilution. Mix gently and thoroughly.

Refer to Dilution Guidelines for further instruction.

<table>
<thead>
<tr>
<th>Guidelines for Dilutions of 100-fold or Greater</th>
<th>100000x</th>
</tr>
</thead>
<tbody>
<tr>
<td>(for reference only; please follow the insert for specific dilution suggested)</td>
<td></td>
</tr>
<tr>
<td>100x</td>
<td></td>
</tr>
<tr>
<td>4 µl sample + 396 µl buffer (100X)</td>
<td>A) 4 µl sample + 396 µl buffer (100X)</td>
</tr>
<tr>
<td>= 100-fold dilution</td>
<td>B) 4 µl of A + 396 µl buffer (100X)</td>
</tr>
<tr>
<td>Assuming the needed volume is less than or equal to 400 µl</td>
<td>= 10000-fold dilution</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1000x</td>
<td></td>
</tr>
<tr>
<td>A) 4 µl sample + 396 µl buffer (100X)</td>
<td>A) 4 µl sample + 396 µl buffer (100X)</td>
</tr>
<tr>
<td>B) 24 µl of A + 216 µl buffer (10X)</td>
<td>B) 4 µl of A + 396 µl buffer (100X)</td>
</tr>
<tr>
<td>= 1000-fold dilution</td>
<td>C) 24 µl of A + 216 µl buffer (10X)</td>
</tr>
<tr>
<td>Assuming the needed volume is less than or equal to 240 µl</td>
<td>= 100000-fold dilution</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
than or equal to 240 µl
12. Plate Preparation

- The 96 well plate strips included with this kit are supplied ready to use. It is not necessary to rinse the plate prior to adding reagents.
- Unused well strips should be returned to the plate packet and stored at 4°C.
- For each assay performed, a minimum of 1 well must be used as a blank, omitting sample and conjugate from well addition.
- For statistical reasons, we recommend each standard and sample should be assayed with a minimum of two replicates (duplicates).
13. Assay Procedure

- Equilibrate all materials and prepared reagents to room temperature prior to use.
- Please read the test protocol carefully before performing the assay. Reliability of results depends on strict adherence to the test protocol as described.
- If performing the test on ELISA automatic systems we recommend increasing the washing steps from three to five and the volume of washing solution from 300 µL to 350 µL to avoid washing effects.
- All controls (Cytomegalovirus IgG Positive, Cytomegalovirus IgG Negative and Cytomegalovirus IgG Cut-off) must be included with each assay performed to determine test results.
- Assay all standards, controls and samples in duplicate.

13.1 Prepare all reagents, standards, and samples as directed in the previous sections.
13.2 Remove excess microplate strips from the plate frame, return them to the foil pouch containing the desiccant pack, reseal and return to 4°C storage.
13.3 Add 100 µL of controls and diluted samples into appropriate wells. Leave one well for substrate blank.
13.4 Cover wells with the foil supplied in the kit and incubate for 1 hour at 37°C.
13.5 Remove the foil, aspirate the contents of the wells and wash each well three times with 300 µL of 1X Washing Solution. Avoid spill over into neighboring wells. The soak time between each wash cycle should be >5 sec. After the last wash, remove the remaining 1X Washing Solution by aspiration or decanting. Invert the plate and blot it against clean paper towels to remove excess liquid.

\[\text{Note: Complete removal of liquid at each step is essential for good assay performance.}\]

13.6 Add 100 µL Cytomegalovirus anti-IgG HRP Conjugate into all wells except for the blank well. Cover with foil.
13.7 Incubate for 30 minutes at room temperature. Do not expose to direct sunlight.
13.8 Repeat step 13.5.
13.9 Add 100 µL TMB Substrate Solution into all wells.
13.10 Incubate for exactly 15 minutes at room temperature in the dark.
13.11 Add 100 µL Stop Solution into all wells in the same order and at the same rate as for the TMB Substrate Solution.
   \( \triangle \textbf{Note:} \) Any blue color developed during the incubation turns into yellow.
13.12 Highly positive samples can cause dark precipitates of the chromogen. These precipitates have an influence when reading the optical density. Predilution of the sample with PBS for example 1:1 is recommended. Then dilute the sample 1:100 with IgG Sample Diluent and multiply the results in Standard Units by 2 (See Section 14. Calculations.)
13.13 Measure the absorbance of the specimen at 450 nm within 30 minutes of addition of the Stop Solution.
   \( \textit{Dual wavelength reading using 620 nm as reference wavelength is recommended.} \)
14. Calculations

In order for an assay to be considered valid, the following criteria must be met:

- **Substrate blank:** Absorbance value < 0.100
- **Negative control:** Absorbance value < 0.200 and < cut-off
- **Cut-off control:** Absorbance value 0.150 – 1.300
- **Positive control:** Absorbance value > cut-off

If these criteria are not met, the test is not valid and must be repeated.

**Calculation of Results**

Calculate the mean background subtracted absorbances for each sample and compare to mean Cut-off control value.

The Cut-off control value is the mean absorbance value of the Cut-off control wells.

*Example:* Absorbance value Cut-off control Well 1 = 0.156  
Absorbance value Cut-off control Well 2 = 0.168

Mean Cut Off value: \((0.156 + 0.168)/2 = 0.162\)

**Interpretation of Results**

Samples are considered to give a positive signal if the absorbance value is greater than 10% over the cut-off value.

Samples with an absorbance value of less than 10% above or below the Cut-off control value should be considered as inconclusive (grey zone) i.e. neither positive or negative. It is recommended to repeat the assay using fresh samples. If results of the second test are again less than 10% above or below the Cut-off control value the sample has to be considered negative.

Samples are considered negative if the absorbance value is lower than 10% below the cut-off.
Results in Standard Units

Patient (mean) absorbance value \times 10 = \text{ Standard Units}

Cut-off

Example: \frac{1.786 \times 10}{0.38} = 47 \text{ Standard Units}

Cut-off: 10 \text{ Standard Units}

Grey zone: 9-11 \text{ Standard Units}

Negative: <9 \text{ Standard Units}

Positive: >11 \text{ Standard Units}
15. Typical Sample Values

SENSITIVITY –
The sensitivity is 98 % and is defined as the probability of the assay scoring positive in the presence of the specific analyte.

PRECISION –

<table>
<thead>
<tr>
<th>Positive Serum</th>
<th>Intra-Assay</th>
<th>Inter-Assay</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Mean</td>
<td>2.86</td>
<td>77.2</td>
</tr>
<tr>
<td>%CV</td>
<td>1.9</td>
<td>6.2</td>
</tr>
</tbody>
</table>

SPECIFICITY –
The specificity is 97.5 % and is defined as the probability of the assay scoring negative in the absence of the specific analyte.

16. Interferences

Interferences with hemolytic, lipemic or icteric sera are not observed up to a concentration of 10 mg/mL hemoglobin, 5 mg/mL triglycerides and 0.2 mg/mL bilirubin.

Please contact our Technical Support team for more information.
## 17. Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low signal</strong></td>
<td>Incubation time to short</td>
<td>Try overnight incubation at 4 °C</td>
</tr>
<tr>
<td></td>
<td>Precipitate can form in wells upon substrate addition when concentration of target is too high</td>
<td>Increase dilution factor of sample</td>
</tr>
<tr>
<td></td>
<td>Using incompatible sample type (e.g. serum vs. cell extract)</td>
<td>Detection may be reduced or absent in untested sample types</td>
</tr>
<tr>
<td></td>
<td>Sample prepared incorrectly</td>
<td>Ensure proper sample preparation/dilution</td>
</tr>
<tr>
<td><strong>Large CV</strong></td>
<td>Bubbles in wells</td>
<td>Ensure no bubbles present prior to reading plate</td>
</tr>
<tr>
<td></td>
<td>All wells not washed equally/thoroughly</td>
<td>Check that all ports of plate washer are unobstructed/wash wells as recommended</td>
</tr>
<tr>
<td></td>
<td>Incomplete reagent mixing</td>
<td>Ensure all reagents/master mixes are mixed thoroughly</td>
</tr>
<tr>
<td></td>
<td>Inconsistent pipetting</td>
<td>Use calibrated pipettes &amp; ensure accurate pipetting</td>
</tr>
<tr>
<td></td>
<td>Inconsistent sample preparation or storage</td>
<td>Ensure consistent sample preparation and optimal sample storage conditions (e.g. minimize freeze/thaw cycles)</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>High background</strong></td>
<td>Wells are insufficiently washed</td>
<td>Wash wells as per protocol recommendations</td>
</tr>
<tr>
<td></td>
<td>Contaminated wash buffer</td>
<td>Make fresh wash buffer</td>
</tr>
<tr>
<td></td>
<td>Waiting too long to read plate after adding stop solution</td>
<td>Read plate immediately after adding stop solution</td>
</tr>
<tr>
<td><strong>Low sensitivity</strong></td>
<td>Improper storage of ELISA kit</td>
<td>Store all reagents as recommended. Please note all reagents may not have identical storage requirements.</td>
</tr>
<tr>
<td></td>
<td>Using incompatible sample type (e.g. Serum vs. cell extract)</td>
<td>Detection may be reduced or absent in untested sample types</td>
</tr>
</tbody>
</table>
18. Notes
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ab108724 Anti-Cytomegalovirus (CMV) IgG Human ELISA Kit
Technical Support

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