INTRODUCTION:
Cytomegalovirus (CMV) is a member of the herpesvirus family and characteristically produces latent infection after primoinfection. It is an important agent of congenital infection and can produce life-threatening illness in transplant and AIDS patients. An active infection resulting from a primary or reactivated latent infection during pregnancy may be transmitted to the fetus or to the infant during birth. The children congenitally infected can have severe central nervous system damage. A primary infection in adults may be asymptomatic or result in various syndromes, including mononucleosis, hepatitis or pneumonitis.

The presence of active CMV infection can be detected by serological methods, but have to be confirmed by using viral isolation or antigen or nucleic acids detection methods. ELISA is the most popular technique for serological diagnosis of CMV infections due to its high sensitivity and easy management. Detection methods based on chemiluminescence have received much attention due to their low background, linearity and wide dynamic range. When coupled to enzyme immunoassays, the signal amplification effect provided by the enzyme enables the design of CLIA (Chemiluminescent ImmunoAssay) tests with shorter incubation times while keeping or improving their sensitivity.

PRINCIPLE OF THE TEST:
The CLIA method is based upon the capture of IgM in the sample with anti-IgM antibodies adsorbed on the polystyrene surface. Unbound immunoglobulins are washed off. Then the antigen labeled with peroxidase reacts with the IgM captured, and the unbound is removed by washing; bound conjugate is developed with the aid of a chemiluminescent substrate solution that will generate a glow-type luminescence that can be read with a luminometer.

KIT FEATURES:
All reagents supplied are ready to use.
Serum dilution solution and conjugate are coloured to help in the performance of the technique.
Sample predilution is not necessary.
Reagents required for the run of the test are included in the monodose presentation.

KIT CONTENTS:
VIRCLA CYTOMEGALOVIRUS IgM MONODOSE: 24 monodoses consisting of 3 reaction wells and 5 reagent wells with the following composition:
Wells A, B, C: reaction wells; wells coated with anti-IgM antibodies (μ-specific).
Well D: Conjugate: orange; containing cytomegalovirus antigen peroxidase conjugate dilution and Neolone and Bronidox as preservatives.

Wells E: Serum dilution solution: blue; phosphate buffer containing protein stabilizers and Neolone and Bronidox as preservatives.
Well F: Calibrator: clear; positive serum dilution containing Neolone and Bronidox as preservatives.
Well G: Substrate component B: clear; containing peroxide.
Well H: Substrate component A: clear; containing luminol.

Store at 2-8ºC and check expiration date.

Materials required but not supplied:
VIRCLA AUXILIARY REAGENTS (REF: VCMAR)
Precision micropipettes 5 and 100 µl.
Eight channel micropipette 100 µl.
Adapted microplate washer.
Thermostatized incubator/water bath.
Microplate luminometer.
Alternatively, a CLIA automated processor.

STORAGE REQUIREMENTS:
Store at 2-8ºC. Do not use the kit reagents beyond the expiration date. This will be valid only if reagents are stored closed and at 2-8ºC.

STORAGE OF REAGENTS ONCE OPENED:

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIRCLA MONODOSE</td>
<td>Once opened, use it in the same day</td>
</tr>
</tbody>
</table>

STABILITY AND HANDLING OF REAGENTS:
Handle reagents in aseptic conditions to avoid microbial contaminations.
Do not let the plate dry between washing and reagent addition.
Substrate component A is light sensitive. Avoid light exposure.
Substrate solution should not get in contact with acid, combustible materials and strong oxidizing or reducing agents.
Make sure that no metal components come in contact with the substrate without having previously tested their compatibility.

VIRCELL, S.L. does not accept responsibility for the mishandling of the reagents included in the kit.

RECOMMENDATIONS AND PRECAUTIONS:
1. For in vitro diagnosis use only. For professional use only.
2. Use kit components only. Do not mix components from different kits or manufacturers. Only components of the AUXILIARY REAGENTS kit are compatible with all VIRCLA references and lots.
3. Clean pipette tips must be used for every assay step. Use only clean, preferably disposable material.
4. Wear protective disposable gloves, laboratory coats and eye protection when handling specimens. Wash hands thoroughly after manipulating samples. Besides, follow all safety protocols in use in your laboratory.
5. Do not use in the event of damage to the package.
7. Serum dilution solution, reaction wells, conjugates and calibrator in this kit include substances of animal origin. Calibrator includes as well substances of human origin. Although the human serum controls of this kit have been tested and found negative for Hepatitis B Surface Antigen (HBsAg), Hepatitis C antibodies and Human Immunodeficiency Virus antibodies, control sera and patient specimens should be
handled as potentially infectious. Reaction wells are coated with inactivated antigen. Nevertheless, they should be considered potentially infectious and handled with care. No present method can offer complete assurance that infectious agents are absent. All material should be handled and disposed as potentially infectious. Observe the local regulations for clinical waste disposal.

8. Substrate solution may be irritant to eyes, respiratory system and skin. In case of contact with this solution, rinse thoroughly with water and seek medical attention. For further information a Material Safety Data Sheet is available.

9. Do not use this product in automated processors unless they have been previously validated for that purpose.

SPECIMEN COLLECTION AND HANDLING:
Blood should be collected aseptically using venipuncture techniques by qualified personnel. Use of sterile or aseptic techniques will preserve the integrity of the specimen. Serum samples are to be refrigerated (2-8°C) upon collection or frozen (-20°C) if the test cannot be performed within 7 days. Samples should not be repeatedly frozen and thawed. Do not use hyperlipemic, hemolysed or contaminated sera. Samples containing particles should be clarified by centrifugation. The kit is suitable for use with serum or plasma.

PRELIMINARY PREPARATION OF THE REAGENTS:
All reagents supplied are ready to use. Only the VIRCLIA WASHING SOLUTION included in the auxiliary component kit VIRCLIA AUXILIARY REAGENTS must be prepared in advance. Fill 50 ml of VIRCLIA WASHING SOLUTION (20x) up to 1 litre with distilled water. Should salt crystals form in the washing concentrate during storage, warm the solution to 37°C before diluting. Once diluted, store at 2-8°C.

ASSAY PROCEDURE:
• AUTOMATED
1. Bring VIRCLIA WASHING SOLUTION (diluted according to the instructions) to room temperature before use (approximately 1 hour).

• MANUAL
1. Set incubator/water bath to 37±1°C.
2. Bring VIRCLIA WASHING SOLUTION (diluted according to the instructions) to room temperature before use (approximately 1 hour).
3. Remove the monodoses from the package and let them reach room temperature before use (approximately 20 minutes). Determine the numbers of monodoses to be employed (one for every sample to be tested).
4. Places the strips into a frame. With the aid of a clean pipette tip, puncture the foil of the well in position E (see the left side of the frame for reference), draw 100 µl of reagent (sample diluted) and dispense it into the white well in position B. Add 5 µl of sample into the white well in position B. Mix homogenously with the aid of a pipette. With the aid of a clean pipette tip, puncture the foil of the well in position F, draw 100 µl of reagent (calibrator) and dispense it into white well in position A. Draw 95 µl of reagent from well E with a new clean tip and add it into the white well in position C, then draw 5 µl of reagent from well F and add it into the white well in position C. Mix homogenously with the aid of a pipette.
5. Incubate at 37±1°C for 20 minutes.

6. Aspirate liquid from wells A, B, C and wash five times with 0.3 ml of VIRCLIA WASHING SOLUTION (diluted according to the instructions) per well. Drain off any remaining liquid.
7. Immediately add 50 µl of VIRCLIA WASHING SOLUTION (diluted according to the instructions) into each one of wells A, B, C.
8. With the aid of a clean pipette tip, puncture the foil of the well in position D, draw 50 µl of reagent (conjugate) and dispense it into the white well in position A. Repeat this step for wells B and C.
9. Incubate at 37±1°C for 20 minutes.
10. Aspirate liquid from wells A, B, C and wash five times with 0.3 ml of VIRCLIA WASHING SOLUTION (diluted according to the instructions) per well. Drain off any remaining liquid.
11. With the aid of a clean pipette tip, puncture the foil of the well in position H, draw 50 µl of reagent (substrate component A) and dispense it into the white well in position A. Repeat this step for wells B and C.
12. With the aid of a clean pipette tip, puncture the foil of the well in position G, draw 50 µl of reagent (substrate component B) and dispense it into the white well in position A. Repeat this step for wells B and C. Mix gently for 10 seconds with the aid of a microtiter plate shaker or by gently tapping the sides of the plate.
13. Incubate at 37°C for 5 minutes protected from light.
14. Measure relative luminescence units (RLU) in wells A, B, C with the help of a luminometer.

INTERNAL QUALITY CONTROL:
Each batch is subjected to internal quality control (Q.C.) testing before batch release complying with specifications stricter than validation protocol for users. Final Q.C. results for each particular lot are available.
The control material is traceable to reference sera panels internally validated.

VALIDATION PROTOCOL FOR USERS:
Each monodose includes one calibrator (well A) and one dilution of the calibrator used as negative control (well C). It allows the validation of the assay and kit.

RLU of the calibrator and the negative control must fall in the following ranges. Otherwise, the test is invalid and must be repeated.

<table>
<thead>
<tr>
<th>Control</th>
<th>RLU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALIBRATOR</td>
<td>2.5-7</td>
</tr>
<tr>
<td>NEGATIVE CONTROL</td>
<td>&lt;2.5</td>
</tr>
</tbody>
</table>

INTERPRETATION OF RESULTS:
Antibody index= (sample RLU/calibrator RLU)

<table>
<thead>
<tr>
<th>Index</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.9</td>
<td>Negative</td>
</tr>
<tr>
<td>0.9-1.1</td>
<td>Equivocal</td>
</tr>
<tr>
<td>&gt;1.1</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Samples with equivocal results must be retested and/or a new sample obtained for confirmation.
Samples with indexes below 0.9 are considered as not having antibodies of the specificity and class measured by this kit.
Samples with indexes above 1.1 are considered as having antibodies of the specificity and class measured by this kit.
LIMITATIONS:
1. This kit is intended to be used with human serum/plasma.
2. The user of this kit is advised to carefully read and understand the package insert. Strict adherence to the protocol is necessary to obtain reliable test results. In particular, correct sample and reagent pipetting, along with careful washing and timing of the incubation steps are essential for accurate results.
3. The results of samples should be used in conjunction with clinical evaluation and other diagnostic procedures. A definitive diagnosis should be made by isolation techniques.
4. This test will not indicate the site of infection. It is not intended to replace isolation.
5. Lack of significant rise in antibody level does not exclude the possibility of infection.
6. Samples collected very early in the course of an infection may not have detectable levels of IgG. In such cases, it is recommended an IgM assay be performed or a second serum sample be obtained 14 to 21 days later to be tested in parallel with the original sample to determine seroconversion.
7. Results in IgG detection in neonates must be interpreted with caution, since maternal IgG is transferred passively from the mother to the foetus before birth. IgM assays are generally more useful indicators of infection in children below 6 months of age.
8. The results of a single-specimen antibody determination should not be used to aid in the diagnosis of recent infection. Paired samples (acute and convalescent) should be collected and tested concurrently to look for seroconversion or a significant rise in antibody level.
9. An IgM response can sometimes accompany re-infections.
10. Low levels of IgM antibodies may occasionally persist for more than 12 months post-infection.
11. A negative result in immunosuppressed patients does not always exclude the possibility of infection.
12. Reactivation of latent infections may not be positive for specific IgM antibodies.
13. The performance results showed correspond to comparative studies with commercial predicative devices in a defined population sample. Small differences can be found with different populations or different predicative devices.

PERFORMANCE:
• SENSITIVITY AND SPECIFICITY:
129 serum/plasma samples were assayed against a commercial ELISA kit. The results were as follows:

<table>
<thead>
<tr>
<th>Sample Nr</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>97%</td>
<td>99%</td>
</tr>
</tbody>
</table>

Indeterminate values were omitted from the final calculations.

• INTRA-ASSAY PRECISION:
3 sera were individually run 10 times each serum in a single automated assay in essentially unchanged conditions. The results were as follows:

<table>
<thead>
<tr>
<th>Serum</th>
<th>N</th>
<th>% C.V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample +</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>CAL</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>CN</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

C.V. Coefficient of variation

• INTER-ASSAY PRECISION:
3 sera were individually run on 5 consecutive days in 2 different automatic processors. The results were as follows:

<table>
<thead>
<tr>
<th>Serum</th>
<th>N</th>
<th>% C.V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample +</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>CAL</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>CN</td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>

C.V. Coefficient of variation

• CROSS REACTIVITY AND INTERFERENCES:
10 samples known to be positive for other herpesvirus group (varicella-zoster, herpes simplex type 1) and other members of the syndromic group (Epstein-Barr virus, Toxoplasma, rubella) were assayed. 2 samples known to be positive for rheumatoid factor were assayed. The negative results of the test demonstrated the specific reaction of the kit with no cross reaction or interferences with the referred specimens.

SYMBOLS USED IN LABELS:

<table>
<thead>
<tr>
<th>IVD</th>
<th>In vitro diagnostic medical device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use by (expiration date)</td>
<td></td>
</tr>
<tr>
<td>Store at x-ºC</td>
<td></td>
</tr>
<tr>
<td>Contains sufficient for &lt;X&gt; test</td>
<td></td>
</tr>
<tr>
<td>LOT</td>
<td>Batch code</td>
</tr>
<tr>
<td>REF</td>
<td>Catalogue number</td>
</tr>
<tr>
<td>HELIX</td>
<td>&lt;X&gt; wells</td>
</tr>
</tbody>
</table>

LITERATURE:
6. Joassin, L. and M. Reginster. 1986. Elimination of nonspecific cytomegalovirus immunoglobulin M activities in the enzyme-

For any questions please contact: customerservice@vircell.com

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