EBV VCA IgM ELISA

NB-06-0179

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1. Intended Use

The EBV VCA IgM Antibody ELISA Test Kit has been designed for the the detection and the quantitative determination of specific IgM antibodies against EBV VCA in serum and plasma. Further applications in other body fluids are possible and can be requested from the TechnicalService.

This assay is intended for research use only.

2. General Information

Infectious mononucleosis is an acute lymphoproliferative disease that is common in children and young adults and is caused by the Epstein-Barr Virus. The EBV is one of the herpes viruses 4 (gamma).

Characteristic clinical features include: 1. Fever, sore throat, and lymhadenopathy; 2. an associated absolute lymphocytosis greater than 50% of which at least 10% are atypical lymphocytes in the peripheral blood; 3. development of transient heterophil and persistent antibody responses against EBV; and 4. abnormal liver function tests.

In 4% of infected young adults there is an icteric manifestation and in 50% splenomegaly. An infectious mononucleosis similar syndrome can be caused by cytomegalovirus, toxoplasmosis and other viral infections; differential diagnosis depends on the laboratory results, EBV being the only virus, that stimulates the production of heterophil antibodies. EBV is present in saliva from individuals with acute infections mononucleosis, and excretion of the virus from the oropharynx continues for many months after clinical disease, this being one of the principle ways of transmission of the disease.

Essential to the diagnosis is the documentation of an increase in the relative and absolute number of lymphocytes and atypical lymphocytes. During disease, cells of the lymphocytic series may consti- tute 50% to 60% of peripheral blood leucocytes, and atypical lymphocytes usually represent at least 10% of them. Alteration in some of the tests for hepatic function and a high titer of heterophil anti- bodies are observed.

Serological tests like EIA are very useful for the detection of anti-EBV IgG and IgM antibodies, especially in cases, where heterophil antibodies are absent. Development of VCA IgG antibodies occurs early in disease, reaches peak titers within 2 to 4 weeks and persists for many years,probably for life. VCA IgM antibodies, however, occur at the beginning but decrease or even disappear within a few months.

3. Principle of the Test

The EBV VCA IgM antibody test kit is based on the principle of the enzyme immunoassay (EIA). EBV VCA antigen is bound on the surface of the microtiter strips. Diluted sample serum or ready-to-use standards are pipetted into the wells of the microtiter plate. A binding between the IgM antibodies of the serum and the immobilized EBV VCA antigen takes place. After a one hour incubation at room temperature, the plate is rinsed with diluted wash solution, in order to removeunbound material. Then ready-to-use anti-human-IgM peroxidase conjugate is added and incubated for 30 minutes. After a further washing step, the substrate (TMB) solution is pipetted and incubated

for 20 minutes, inducing the development of a blue dye in the wells. The color developmentis terminated by the addition of a stop solution, which changes the color from blue to yellow.

The resulting dye is measured spectrophotometrically at the wavelength of 450 nm. The concentration of the IgM antibodies is directly proportional to the intensity of the color.

4. Limitations, Precautions and General Comments

- Only for research use! Do not ingest or swallow! The usual laboratory safety precautions as well as the prohibition of eating, drinking and smoking in the lab have to be followed.
- All sera and plasma or buffers based upon, have been tested respective to HBsAg, HIV and HCV with recognized methods and were found negative. Nevertheless precautions like the use of latex gloves have to be taken.
- Serum and reagent spills have to be wiped off with a disinfecting solution (e.g. sodium hypochlorite, 5%) and have to be disposed of properly.
- All reagents have to be brought to room temperature (18 to 25 °C) before performing the test.
- Before pipetting all reagents should be mixed thoroughly by gentle tilting or swinging. Vigorous shaking with formation of foam should be avoided.
- It is important to pipet with constant intervals, so that all the wells of the microtiter plate have the same conditions.
- When removing reagents out of the bottles, care has to be taken that the stoppers are not contaminated. Further a possible mix-up has to be avoided. The content of the bottles is usually sensitive to oxidation, so that they should be opened only for a short time.
- In order to avoid a carry-over or a cross-contamination, separate disposable pipet tips have to be used.
- No reagents from different kit lots have to be used, they should not be mixed among one another.
- All reagents have to be used within the expiry period.
- In accordance with a Good Laboratory Practice (GLP) or following ISO9001 all laboratory devices employed should be regularly checked regarding the accuracy and precision. This refers amongst others to microliter pipets and washing or reading (ELISA-Reader) instrumentation.
- The contact of certain reagents, above all the stopping solution and the substrate with skin, eye and mucosa has to be avoided, because possible irritations and acid burns could arise, and there exists a danger of intoxication.

5. Reagents Provided

Store kit components at 2-8°C and do not use after the expiry date on the box outer label. Beforeuse, all components should be allowed to warm up to ambient temperature (18-25°C). After use, the plate should be resealed, the bottle caps replaced and tightened and the kit stored at 2-8°C. The opened kit should be used within three months.

Components	Volume / Qty.
EBV VCA antigen coated microtiter strips	12
Calibrator A (Negative Control)	2 mL
Calibrator B (Cut-Off Standard)	2 mL
Calibrator C (Weak Positive Control)	2 mL
Calibrator D (Positive Control)	2 mL
Enzyme Conjugate	15 mL
Substrate	15 mL
Stop Solution	15 mL
Sample Diluent	60 mL
Washing Buffer (10x)	60 mL
Plastic foils	2
Plastic bag	1

5.1. Microtiter Strips

12 strips with 8 breakable wells each, coated with a EBV VCA antigen (P3H3 cell extract, cultured in human Burkitt lymphoma cells). Ready-to-use.

5.2. Calibrator A (Negative Control)

2 mL, protein solution diluted with PBS, contains no IgM antibodies against EBV VCA. Additionof 0.01 % methylisothiazolone and 0.01 % bromonitrodioxane. Ready-to-use.

5.3. Calibrator B (Cut-Off Standard)

2 mL human serum diluted with PBS, contains a low concentration of IgM antibodies against EBV VCA. Addition of 0.01 % methylisothiazolone and 0.01 % bromonitrodioxane. Ready-to-use.

5.4. Calibrator C (Weak Positive Control)

2 mL, human serum diluted with PBS, contains a medium concentration of IgM antibodies against EBV VCA. Addition of 0.01 % methylisothiazolone and 0.01 % bromonitrodioxane. Ready-to-use.

5.5. Calibrator D (Positive Control)

2 mL, human serum diluted with PBS, contains a high concentration of IgM antibodies against EBV VCA. Addition of 0.01 % methylisothiazolone and 0.01 % bromonitrodioxane. Ready-to-use.

5.6. Enzyme Conjugate

15 mL, anti-human-IgM-HRP (rabbit), in protein-containing buffer solution. Addition of 0.01 % methylisothiazolone and 0.01 % bromonitrodioxane and 5 mg/L Proclin™. Ready-to-use.

5.7. Substrate

15 mL, TMB (tetramethylbenzidine). Ready-to-use.

5.8. Stop Solution

15 mL, 0.5 M sulfuric acid. Ready-to-use.

5.9. Sample Diluent

60 mL, PBS/BSA buffer. Addition of 0.095 % sodium azide. Ready-to-use.

5.10. Washing Buffer

60 mL, PBS + Tween 20, 10x concentrate. Final concentration: dilute 1+9 with distilled water. If during the cold storage crystals precipitate, the concentrate should be warmed up at 37°C for15 minutes.

5.11. Plastic Foils

2 pieces to cover the microtiter strips during the incubation.

5.12. Plastic Bag

Resealable, for the dry storage of non-used strips.

6. Materials Required but not Provided

- 5 µL-, 100 µL- and 500 µL micro- and multichannel pipets
- Microtiter Plate Reader (450 nm)
- Microtiter Plate Washer
- Reagent tubes for the serum dilution
- Bidistilled water

7. Specimen Collection and Handling

Principally serum or plasma (EDTA, heparin) can be used for the determination. Serum is separated from the blood, which is aseptically drawn by venipuncture, after clotting and centrifugation. The serum or plasma samples can be stored refrigerated (2-8°C) for up to 48 hours, for a longer storage they should be kept at -20 °C. The samples should not be frozen and thawed repeatedly. Lipemic, hemolytic or bacterially contaminated samples can cause false positive or false negative results.

For the performance of the test the samples (not the standards) have to be diluted 1:101 with ready- to-use sample diluent (e.g. 5 µL serum + 500 µL sample diluent).

8. Assay Procedure

8.1. Preparation of Reagents

Washing Solution: dilute before use 1+9 with distilled water. If during the cold storage crystals precipitate, the concentrate should be warmed up at 37°C for 15 minutes.

- Strict adherence to the protocol is advised for reliable performance. Any changes or modifications are the responsibility of the user.
- All reagents and samples must be brought to room temperature before use, but should not be leftat this temperature longer than necessary.
- Standards and samples should be assayed in duplicates.
- A standard curve should be established with each assay.
- Return the unused microtiter strips to the plastic bag and store them dry at 2-8°C.

8.2. Assay Steps

1. Prepare a sufficient amount of microtiter wells for the standards, controls and samples in duplicate as well as for a substrate blank.
2. Pipet 100 µL each of the **diluted** (1:101) samples and the **ready-to-use** standards and controls respectively into the wells. Leave one well empty for the substrate blank.
3. Cover plate with the enclosed foil and incubate at room temperature for 60 minutes.
4. Empty the wells of the plate (dump or aspirate) and add 300 µL of diluted washing solution.This procedure is repeated totally three times. Rests of the washing buffer are afterwardsremoved by gentle tapping of the microtiter plate on a tissue cloth.
5. Pipet 100 µL each of ready-to-use conjugate into the wells. Leave one well empty for the substrate blank.
6. Cover plate with the enclosed foil and incubate at room temperature for 30 minutes.
7. Empty the wells of the plate (dump or aspirate) and add 300 µL of diluted washing solution.This procedure is repeated totally three times. Rests of the washing buffer are afterwardsremoved by gentle tapping of the microtiter plate on a tissue cloth.
8. Pipet 100 µL each of the ready-to-use substrate into the wells. This time also the substrate blankis pipetted.
9. Cover plate with the enclosed foil and incubate at room temperature for 20 minutes in the dark (e.g. drawer).
10. To terminate the substrate reaction, pipet 100 µL each of the ready-to-use stop solution into the wells. Pipet also the substrate blank.
11. After thorough mixing and wiping the bottom of the plate, perform the reading of the absorption at 450 nm (optionally reference wavelength of 620 nm). The color is stable for at least 60 minutes.

9. Evaluation

The mean values for the measured absorptions are calculated after subtraction of the substrate blankvalue. The difference between the single values should not exceed 10%.

Example

	OD Value	corrected OD	Mean OD Value
Substrate Blank	0.015		
Negative Control	0.029 / 0.030	0.014 / 0.015	0.015
Cut-Off Standard	0.526 / 0.566	0.511 / 0.551	0.531
Weak Positive Control	0.969 / 0.919	0.954 / 0.904	0.929
Positive Control	1.821 / 1.859	1.806 / 1.844	1.825

The above table contains only an example, which was achieved under arbitrary temperature and environmental conditions. The described data constitute consequently **no reference values** which have to be found in other laboratories in the same way.

9.1. Qualitative Evaluation

The calculated absorptions for the sample sera, as mentioned above, are compared with the valuefor the cut-off standard. If the value of the sample is higher, there is a positive result.

For a value below the cut-off standard, there is a negative result. It seems reasonable to define a range of +/-20 % around the value of the cut-off as a grey zone. In such a case the repetition of the test with the same serum or with a new sample of the same individual, taken after 2-4 weeks, is recommended. Both samples should be measured in parallel in the same run.

The positive control must show at least the double absorption compared with the cut-off standard.

9.2. Quantitative Evaluation

The ready-to-use standards and controls of the EBV VCA antibody kit are defined and expressed in arbitrary units (U/mL). This results in an exact and reproducible quantitative evaluation. Consequently for a given sample, follow-up controls become possible. The values for controls and standards in units are printed on the labels of the vials.

For a quantitative evaluation the absorptions of the standards and controls are graphically drawn against their concentrations. From the resulting reference curve the concentration values for each sample can then be extracted in relation to their absorptions. It is also possible to use automatic computer programs.

10. Assay Characteristics

EBV VCA ELISA	IgG	IgA	IgM
Intra-Assay-Precision	9.4 %	5.8 %	7.0 %
Inter-Assay-Precision	1.6 – 14.1 %	3.4 – 5.0 %	6.3 – 12.1 %
Inter-Lot-Precision	4.3 – 14.0 %	3.9 – 8.7 %	2.7 – 10.8 %
Analytical Sensitivity	1.29 U/mL	1.01 U/mL	0.86 U/mL
Recovery	86 – 92 %	100 – 104 %	113 – 119 %
Linearity	80 – 98 %	84 – 116 %	78 – 118 %
Cross-Reactivity	No cross-reactivity to Measles, Mumps and Varicella		
Interferences	No interferences to bilirubin up to 0.3 mg/mL, hemoglobin up to 8.0mg/mL and triglycerides up to 5.0 mg/mL		
Clinical Specificity	100 %	99 %	100 %
Clinical Sensitivity	96 %	100 %	89 %

11. References

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