

CE

---



**EPSTEIN-BARR VIRUS (VCA)**

**IgM CLASS**

**96 WELL ELISA KIT**

PACKAGE INSERT  
INSTRUCTIONS AND INFORMATION

Store at 2-8°C



---

Product Code: 200 0140  
Document Number :KBK-0040  
Issue No: 4

## 1. INTENDED USE

This kit is an *in-vitro* laboratory assay for the determination of IgM class Antibodies against Epstein-Barr Virus (VCA).

## 2. INTRODUCTION

Epstein-Barr Virus (EBV) belongs to the herpes family, sub-group Gamma, DNA virus of 120-200nm. The virus occurs worldwide with most people becoming infected at some time in their life. It is almost impossible to prevent the transmission of the virus as many healthy people carry and spread the virus intermittently.

Infants become susceptible to EBV as soon as maternal antibody protection disappears. Children's infections are usually asymptomatic however infection in youths and young adults causes infectious mononucleosis (IM) 35% to 50% of the time.

There are no known associations between EBV infection and problems during pregnancy, such as miscarriages or birth defects. Symptoms of IM usually resolve in 1-2 months however, EBV can remain dormant or latent in a few cells in the throat and blood for life. The virus may be reactivated and is commonly found in the saliva of infected individuals. The reactivation may be asymptomatic. EBV also establishes a lifelong dormant infection in some cells of the body's immune system. A late event in a very few carriers of this virus is the emergence of Burkitt's lymphoma and nasopharyngeal carcinoma, however it is probably not the sole cause of the malignancy.

## 3. PRINCIPLE OF THE TEST

Epstein-Barr Virus (EBV) antibody test is an indirect solid-phase enzyme immunoassay that detects EBV specific IgM in human serum.

EBV antigens (coated onto microwells) bind corresponding antibodies in patient's serum, forming an IgM-Ag complex. Anti-human IgM conjugated with the enzyme horseradish peroxidase (HRP) is added and binds to immobilized IgM.

This complex is then reacted with a specific substrate, Tetramethylbenzidine (TMB), to yield a blue colour. The intensity of the colour is proportional to the amount of EBV-specific IgM antibodies in the serum. Sulphuric acid is added to stop the reaction. This produces a yellow endpoint colour.

Following termination of colour development, the absorbance is measured at 450 and reference at 620nm.

#### 4. KIT COMPONENTS

1. Epstein-Barr Virus (EBV) Coated Wells (IgM): 12 breakapart 8-well snap-off strips coated with EBV antigen; vacuum sealed, in resealable aluminium foil.
2. Epstein-Barr Virus (EBV) IgM Positive Control\*\*\*: 1 bottle containing 2 ml; coloured yellow; ready to use; red cap.
3. Epstein-Barr Virus (EBV) IgM Cut-off Control\*\*\*: 2 bottle containing 1.5 ml; coloured yellow; ready to use; yellow cap.
4. Epstein-Barr Virus (EBV) IgM Negative Control\*\*\*: 1 bottle containing 2 ml; coloured yellow; ready to use; blue cap.
5. IgM Sample Diluent \*\*\*: 2 bottles containing 50 ml of buffer for sample dilution; pH 7.2 ± 0.2; coloured green; ready to use; Green cap.
6. Epstein-Barr Virus (EBV) anti-IgM conjugate\*\* : 2 bottles containing 10 ml of peroxidase labelled rabbit antibody to human IgG; coloured red, ready to use; red cap.
7. Washing Solution (20x conc.)\*: 1 bottle containing 50 ml of a 20-fold concentrated buffer (pH 7.2 ± 0.2) for washing the wells; white cap.
8. TMB Substrate Solution: 1 bottle containing 15 ml 3,3',5,5'-tetramethylbenzidine (TMB); ready to use; amber cap. Colourless solution.
9. Stop Solution: 1 bottle containing 15 ml sulphuric acid, 0.2 mol/l; ready to use; clear cap

\* contains 0.01 % Kathon after dilution

\*\* contains 0.2 % Bronidox L

\*\*\* contains 0.1 % Kathon

10. 1 Strip holder

11. 1 Package Insert

#### 5. OTHER EQUIPMENT REQUIRED BUT NOT SUPPLIED

##### **This protocol has been validated for the Triturus™ Analyser**

1. MICROWELL PLATE READER (capable of reading at 450 / 620 nm).
2. WASH BOTTLE - 500mL or suitable MICROWELL PLATE WASHER.
3. MEASURING CYLINDERS
4. MULTICHANNEL PIPETTE
5. REAGENT TROUGHS
6. VARIABLE VOLUME PIPETTORS (10µL – 2mL) AND DISPOSABLE TIPS
7. INCUBATOR 37°C
8. DISTILLED WATER
9. VORTEX TUBE MIXER
10. TIMER
11. DISPOSABLE TUBES

## 6. ASSAY PROCEDURE

- Review all instructions thoroughly before testing.
- Room temperature incubations should be performed at 20 – 24°C.
- All reagents, samples and controls should be brought to room temperature before use.
- Unused strips are to be returned to the foil pouch along with the desiccant and resealed.
- The kit components should not be left at room temperature for longer than the procedure requires. Store kits and kit components at 2 – 8°C when not in use.
- Kit components from different lot numbers should not be interchanged.
- The WASH BUFFER CONCENTRATE (20x) may crystallise at 4°C. Incubate in a 37°C water bath until crystals have dissolved.
- To ensure accurate quantification, it is essential that all pipettes used in the assay are calibrated and a fresh tip is used for cut-off, controls and samples.
- Specimens can be stored at 2-8°C for 5 days before testing. If the assay is not completed within this time then aliquot and freeze (-20 to -70°C). Avoid repeated freezing and thawing.
- This assay requires
  - 1 well for substrate blank
  - 1 well for negative control
  - 2 wells for cutoff
  - 1 well for positive control
- Once started, finish the assay without interruption.

1. Perform a 1/101 dilution on the test sera.

NB: CONTROLS ARE READY TO USE

2. Remove the required number of microwells from the sealed bag and place them in the holder. Ensure unused wells are resealed and stored at 4°C.
3. Pipette 100µl of diluted samples and ready-to-use controls to the appropriate wells. Remember to leave a substrate blank.
4. Incubate for 60 MINUTES ± 5 MINUTES AT 37±1°C
5. Dilute the WASH BUFFER CONCENTRATE (20x) 1/20 with distilled water. Place in either a wash bottle or plate washer reservoir.
6. Wash Procedure: Aspirate the samples from the wells and then fill all wells with diluted WASH BUFFER (350µL/well) soak for 20 seconds on the first wash. Repeat the above for 4 more cycles but with no soak time.  
NB: The washing protocol needs to be programmed for a STRIP WASH not a plate wash.
7. Add 100µL of EBV\_anti-IgM CONJUGATE to all microwells except the substrate blank.
8. Incubate the plate for 30 MINUTES ± 5 MINUTES at ROOM TEMPERATURE.
9. Wash the plate as in step 6 using a plate wash. NB no soak time is required in this wash step.
10. Add 100µL/well of TMB SUBSTRATE to all microwells. Incubate the plate at ROOM TEMPERATURE for 15 MINUTES.
11. Stop the reaction by adding 100µL/well of STOP SOLUTION to the microwells.
12. Read the plate at 450/620nm within 15mins of stopping the reaction
13. Calculate the corrected optical densities (O.D.) by subtracting the Blank O.D. from the mean O.D. of the controls and samples.

## 7. CALCULATION AND INTERPRETATION OF RESULTS

The CUT-OFF is the mean absorbance value of the Cut-off control OD's.

Samples are considered DETECTED if the absorbance value is higher than 10% over the cut-off.

Samples are considered NOT DETECTED if the absorbance value is lower than 10% below the cut-off.

Samples with an absorbance value 10% above or below the cut-off should not be considered as clearly DETECTED or NOT DETECTED but in a grey zone.

It is recommended to repeat the test again 2 -4 weeks later with a fresh sample. If results in the second test are again in the grey zone the sample is to be considered NOT DETECTED.

If a unit result is required apply the following formula

$$\frac{\text{Patient (mean) OD} \times 10}{\text{Cut-off}} = ?? \text{ units}$$

Cut-off :	10 units
Grey Zone:	9-11 units
NOT DETECTED:	<9 units
DETECTED:	>11 units

## 8. PRECAUTIONS

1. In compliance with article 1 paragraph 2b European directive 98/79/EC, the use of this in vitro diagnostic medical devices is intended by the manufacturer to secure suitability, performances and safety of the product. Therefore the test procedure, the information, the precautions and warnings in the instructions for use have to be strictly followed. The use of the test kits with analysers and similar equipment has to be validated. Any change in design, composition and test procedure as well as for any use in combination with other products not approved by the manufacturer is not authorized; the user himself is responsible for such changes. The manufacturer is not liable for false results and incidents for these reasons. The manufacturer is not liable for any results by visual analysis of the patient samples.
2. All components containing material of human origin have been tested and found negative for HBsAg, anti-HCV and antibodies to HIV. They should still, however, be treated as though they were potentially infectious.
3. Do not substitute any component for the ones supplied with the kit.
4. All components that contain preservatives must have care exercised in handling/disposing of these products.
5. Heat inactivation or repeated freezing and thawing of serum samples may cause erroneous results.
6. Performing the assay at temperatures other than those stated may cause erroneous results.
7. Do not use components after the expiry date stated on the label.
8. Care should be taken to reduce microbial contamination of reusable kit components.
9. To avoid cross-contamination do not interchange screw caps of components.
10. It is recommended that external or "in-house" controls be included with each assay.

**WARNING: In the used concentration Bronidox L has hardly any toxicological risk upon contact with skin and mucous membranes!**

**WARNING: Sulphuric acid irritates eyes and skin. Keep out of the reach of children. Upon contact with the eyes, rinse thoroughly with water and consult a doctor!**

## 9. REAGENT STORAGE AND SHELF LIFE

- All kit components must be stored at 2 – 8°C. All reagents are stable until labelled expiration date when stored at 2 – 8°C.

## 10. SPECIMEN COLLECTION

- Blood should be collected by venepuncture.
- Specimens can be stored at 2-8°C for 5 days before testing. If the assay is not completed within this time then aliquot and freeze (-20 to -70°C). Avoid repeated freezing and thawing.

## 11. QUALITY CONTROL

- The Substrate Blank, Cutoff, Positive Control and Negative Control should be run each time the assay is performed.
- Substrate blank: Absorbance value lower than 0.300.
- Negative control: Absorbance value lower than 0.200.
- Cut-off control: Absorbance value between 0.250 and 0.900.
- Positive control: Absorbance value equal to or greater than the cut-off value.

## 12. LIMITATIONS

- As with other diagnostic test procedures, the results obtained serve only as an aid to diagnosis and should not be interpreted as diagnostic in themselves.
- Data from immunocompromised patients and newborns have only restricted value.
- Bacterial contamination or repeated freeze-thaw cycles of the specimen may affect the absorbance values
- Interferences with haemolytic, lipemic or icteric sera are not observed up to a concentration of 10 mg/ml haemoglobin, 5 mg/ml triglycerides and 0.2 mg/ml bilirubin.

## 13. TECHNICAL PERFORMANCE

### A. INTRA-ASSAY VARIATION

Sample No.	n	Mean	%CV
Pos Serum	25	1.32	5.1

### B. INTER-ASSAY VARIATION

Sample No.	n	Mean	%CV
Pos. Serum	24	1.37	6.9

- The diagnostic specificity is defined as the probability of the assay scoring a negative in the absence of the specific analyte.  
It is >94.4 %.
- The diagnostic sensitivity is defined as the probability of the assay scoring a positive in the presence of the specific analyte.  
It is >92.3 %.

## 14. REFERENCES

- Bergman M., Gleckman R.A., "Heterophil-negative infectious mononucleosis-like syndrome". *Postgrad.Med.*, 81 (1):313-326(1987)
- Buchwald D., Komaroff A.L., "Review of laboratory findings for patient with chronic fatigue syndrome". *Rev.Inf.Dis.*, 13(Suppl.1):S12-S18 (1991)
- De Ory F., Antonaya J., Fernandez M.V., Echevarria J.M., "Application of low-avidity immunoglobulin G studies to diagnosis of EBV infectious mononucleosis". *J.Clin.Microbiology.*, 31 (6):1669-1671 (1993)
- De-The, G., "Epidemiology of EBV and Associated Diseases in Man", In : *The Herpesviruses*, Roizman, B.(ed)., Volume 1, New York : Plenum-Press, 25-103, (1982)
- Dolken G., Weitzmann U., Boldt C. et al., "Enzyme linked immunosorbent assay for IgG antibodies of virus associated early antigens and viral capsid antigen". *J. Immunol. Meth.*, 67:225-223 (1984).
- Farber I., Wutzler P., Wohlrabe P. et al., "Serological diagnosis of infectious mononucleosis using three different anti-Epstein-Barr virus recombinant ELISAs", *J. Virol. Meth.*; 42:301-308, (1993).
- Gorgievski-Hrisoho M., Hinderer W., Nebel-Schickel H. et al., " Serodiagnosis of infectious mononucleosis by using recombinant Epstein-Barr virus antigens and enzyme-linked immunosorbent assay technology", *J.Clin.Microbiol.*,28 (10): 2305-1211, (1990).
- Halprin J., Scott A.L., Jacoboson L. et al., " Enzyme-linked immunosorbent assay of antibodies to Epstein-Barr virus nuclear and early antigens in patients with infectious mononucleosis and nasopharyngeal carcinoma", *Ann. Int. Med.*, 104:331-337, (1986).
- Heath, C.W., Brodsky A.L., and Ptolosky A.L., "infectious Mononucleosis in a general population", *Am. J. Epidomolgy*, 95 (1):46-52, (1972)
- Henle W., Henle G.E., Horwitz C.A., "Epstein-Barr virus specific diagnostic tests in infectious mononucleosis", *Human Pathol.*, 5 (5):551-565, (1974).
- Lamy M.E., Favart A.M., Cornu A. et al., " Study of Epstein-Barr virus (EBV) antibodies : IgG and IgM anti VCA, IgG anti EA and IgG anti-EBNA obtained with an original microtitre technique. Serological criterions of primary recurrents EBV infections and follow-up of infectious mononucleosis. Seroepidemiology of EBV in Belgium based on 5178 sera from patients". *Acta Clin. Belg.*, 37 (5): 281-289, (1982)
- Lennette E., " Epstein-Barr virus", *Man. Of Cli. Micro.*, 4<sup>th</sup> Ed. Washington D.C., Am. Soc Microbiol. P 728-732, (1985)
- Luca J., Chase P.C., Pearson G.R., " A sensitive enzyme-linked immunosorbent assay (ELISA) against the major EBV-associated antigens. I-Correlation between ELISA and immunofluorescence titers using purified antigens", *J. Immunol. Metho.*, 67: 145-156, (1984)
- Pearson G.P., " Infectious Mononucleosis: the humoral response", In: *Infectious mononucleosis*, D. Schlossberg ed., Springer-Verlag, New York, p. 89-99 (1989).
- Pechedy C., "Laboratory testing for infectious mononucleosis: cautions to observe in interpreting results". *Postgrad. Med.*, 81 (1): 335-342 (1987).
- Purtilo B.T., Hinrichs S., " Detection of Epstein-Barr virus induced diseases by laboratory techniques", *Incstar Monograph*, (1993)

## 15. LIMITED EXPRESS LIABILITY

The manufacturer makes no express warranty other than the diagnostic kit will measure IgM antibodies against Epstein-Barr Virus when used in accordance with the manufacturer's instructions. The use of the diagnostic kit for any other purpose or for the clinical diagnosis of a disease state is outside the intended use of this product.

The manufacturer disclaims any and all implied merchantability, fitness for use or implied utility for any other purpose. Any or all damages for failure of the diagnostic kit to perform according to its instructions are limited to the replacement value of the kit.

In some jurisdictions the law makes these disclaimers unenforceable and, accordingly all or part of the disclaimer may not apply to all users.



Manufactured by:  
Vital Diagnostics Pty Ltd  
5/18 Lexington Drive  
Bella Vista NSW 2153  
Australia  
P +61 (0)2 9894 6988  
F +61 (0)2 9899 6303  
ACN 003 153 286



Vital Diagnostics S.r.l.  
Via Balzella 41/G/4  
47122 Forli Italy