Version 22-04/24

User's Manual

Epstein-Barr Virus EA IgG ELISA Kit

REF **DEIA-NS2310-9**

Σ **96T**

RUO

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

For illustrative purposes only. To perform the assay the instructions for use provided with the kit have to be used.

Creative Diagnostics

Address: 45-1 Ramsey Road, Shirley, NY 11967, USA

Tel: 1-631-624-4882 (USA) 44-161-818-6441 (Europe) **Fax: 1-631-938-8221**

Email: info@creative-diagnostics.com **Web: www.creative-diagnostics.com**

PRODUCT INFORMATION

Intended Use

The Epstein-Barr Virus Early Antigen (EA) IgG may be used as quantitative and qualitative tests for detection of human anti-Epstein-Barr Virus antibodies in serum or plasma. For sale in the U.S. for Research Use Only. Not for use in diagnostic procedures.

General Description

Epstein-Barr Virus (EBV), a DNA virus, is a member of the Human Herpesvirus group and is pathogenic for humans. EBV transmission takes place primarily via the saliva of infected individuals. Transfer of the virus via blood, blood products and bone marrow transplants have also been reported, but this mode of transmission is comparatively rare. On primary infection, the cells of the salivary gland are infected first. At this stage of infection respiratory symptoms are very common. Due to the subsequent infection of B cells in the adjacent lymphoid tissue, the virus spreads throughout the body. Infection of B cells results in a polyclonal stimulation of lymphoproliferation which is normally controlled by the immune system. In the later course of infection, high fever, splenomegaly, lymphadenitis, thrombocytopenia and hepatitis may be observed. The disease resulting from primary infection is called infectious mononucleosis (IM) or glandular fever. Since viral transmission principally happens by oral contact, the primary infection has also been called "kissing disease". In rare cases acute mononucleosis may progress to a chronic disease, and reactivation of EBV has been observed in immunosuppressed patients.

EBV is closely associated with nasopharyngeal carcinoma, and Burkitt lymphoma (BL), is at least partly correlated with EBV. This B cell tumor of monoclonal origin is endemically clustered in tropical regions of Africa and Asia. The geographical distribution of BL correlates with that of malaria. Since it is believed that infections with Plasmodium have some influence on the immune system, it is suggested that malaria might be an important cofactor for the development of Burkitt lymphoma in these regions. Due to the complex structure of the virus, the tight regulation of the viral life cycle, and the appearance of latent or productive infections, the antibody response seen after EBV infection may be quite complex and therefore difficult to interpret.

Principles of Testing

Microtiter wells are coated with antigens. This constitutes the solid phase. Sample is added to the wells and any antibodies specific for the antigen present will bind to the solid phase. After removal of unbound material, anti-human IgG conjugated to an enzyme (alkaline phosphatase) is allowed to react with the immune complex. After removal of excess conjugate by washing, an appropriate substrate (paranitrophenylphosphate) is added, with which the conjugated enzyme reacts producing a colored derivative of the substrate. The color intensity is proportional to the level of specific antibody bound and can be quantified photometrically.

Reagents And Materials Provided

1. Break apart microtiter test strips each with 8 antigen coated single wells (altogether 96), MTP, 1 frame, the coating material is inactivated

2. Standard serum (ready-to-use), Human serum in phosphate buffer with protein; negative for anti-HIV-Ab,

HBs-Ag (Hepatitis B-Virus-surface antigen) and anti-HCV-Ab; preservative: <0.1% sodium azide colouring: Amaranth O. 2 × 2 ml

3. Negative control serum (ready-to-use) NEG, Human serum in phosphate buffer with protein; negative for anti-HIV-Ab, HBs-Ag (Hepatitis B-Virus-surface antigen) and anti-HCV-Ab; preservative: <0.1% sodium azide colouring: Lissamine green V, 2 ml.

4. Anti-human-IgG-conjugate (ready-to-use) APC, Anti-human-IgG from goat (polyclonal), conjugated to alkaline phosphatase, stabilized with protein stabilization solution preservative: 0.01 % methylisothiazolone, 0.01 % bromnitrodioxane. 13 ml

5. Washing solution concentrate (sufficient for 1000ml) WASH, Sodium chloride solution with Tween 20, 30 mM Tris preservative: <0.1% sodium azide. 33.3 ml

6. Dilution buffer or S1 dilution buffer DILBS1, Phosphate buffer with protein and Tween 20; preservative: <0.1% sodium azide 0.01 g/l Bromphenol blue sodium salt. 2 × 50 ml

7. Stopping solution STOP, 1.2 N sodium hydroxide. 15 ml.

8. Substrate (ready-to-use) pNPP, Para-nitrophenylphosphate, solvent free buffer preservative: <0.1 % sodium azide (Substrate in unopened bottle may have a slightly yellow coloring. This does not reduce the quality of the product!). 13 ml

Materials Required But Not Supplied

1. common laboratory equipment
2. photometer for microtiter plates with filter, wavelength 405 nm, recommended reference wavelength 620 nm - 690 nm (e.g. 650 nm)
3. incubator 37°C
4. moist chamber
5. distilled water

Storage

1. Microtiter strips (antigen), after opening at 2-8°C in closed aluminum-bag with desiccant. Strips which are not used must be stored in the press-seal bag of aluminum compound foil under dry and airtight conditions! See expiry date on microtiter plate. Minimum shelf-life: 4 weeks. Shelf-life in case of proper use and storage until expiry date.
2. Control sera / standard sera, after opening at 2-8°C. Until expiry date; 24 months after date of production
3. Conjugate. Ready-to-use solution, at 2-8°C, until expiry date, 28 months after date of production. **Avoid contamination (sterile tips!)**
4. Dilution buffer, after opening at 2-8°C, 24 months. Discard cloudy solutions! Unopened, until expiry date, 36 months after date of production.
5. Special dilution buffer for EA-IgG, after opening at 2-8°C, 24 months. Discard cloudy solutions! Unopened, until expiry date, 36 months after date of production.
6. Washing solution. Concentrate after opening at 2-8°C, until expiry date. Working dilution at 2-8°C, 2 weeks. Working dilution at room temperature, 1 week. Bottles used for the working dilution should be cleaned regularly, discard cloudy solutions.

7. Substrate. Ready-to-use solution at 2-8°C, protected from light! Until expiry date, 24 months after date of production. Avoid contamination (sterile tips!) Discard when solution turns yellow (extinction against distilled water. > 0.25).
8. Stopping solution, after opening at room temperature, until expiry date.

Specimen Collection And Preparation

Lipaemic, hemolytic or icteric samples should only be tested with reservations although in our testing no negative influence has been found. Obviously contaminated samples (serum or plasma) should not be tested due to the risk of wrong results.

Serum or plasma (EDTA, citrate, heparin) collected according to standard laboratory methods are suitable samples. **Samples must not be thermally inactivated.**

Sample preparation

Before running the test, samples must be diluted in dilution buffer (V1 + V2) as follows: (S1 dilution buffer)

$V_1 + V_2 = 1 + 100$	add	10 µl	sample
	each to	1000 µl	dilution buffer

After dilution and before pipetting into the microtiter plate the samples must be mixed thoroughly to prepare a homogenous solution.

Sample storage

The stoppered samples can be stored in a refrigerator up to 7 days at 2-8°C. Extended storage is possible at ≤ -20°C.

Avoid repeated freezing and thawing of samples.

Diluted samples can be stored at 2-8°C for one week.

Reagent Preparation

1. Microtest strips

Microtest strips in frame are packed with desiccant in an aluminum bag. Take unrequired cavities out of the frame and put them back into the press-seal bag. Close press-seal bag carefully to ensure airtight conditions.

2. Control sera / standard sera

Control and standard sera are ready-to-use and must not be diluted any further.

They can be used directly for the test run.

For each test run and for each test system - independent of the number of microtest strips to be used - control and standard sera must be included. The cut-off-control should be set up in duplicate. With the quantitative tests the standard serum should also be set up in duplicate.

Do not treat control sera with Rf-absorbent.

3. Anti-human-IgG-AP-conjugate (ready-to-use)

Conjugates with the same concentration and within the same immunoglobulin class are exchangeable.

Avoid contamination of ready-to-use conjugates (please pour sufficient for test into a secondary container to avoid repeatedly pipetting from the original bottle).

4. Washing solution

Dilute washing buffer concentrate (V1) 1:30 with distilled water to a final volume of V2.

Example:

buffer concentrate (V_1)	final volume (V_2)
33.3 ml	1000 ml
1 ml	30 ml

5. Dilution buffer for samples (ready-to-use)

Samples for the EA-IgG ELISA are diluted with special S1-dilution buffer.

6. Substrate (ready-to-use)

For pipetting substrate solution use sterile tips only!

7. Stopping solution (ready-to-use)

Assay Procedure

1. Place the required number of cavities in the frame and prepare a protocol sheet.
2. Add each 100 µl of diluted sample or ready-to-use controls into the appropriate wells of microtest strips. Spare one well for substrate blank, e.g.:

IgG quantitative	
well A1	substrate blank
well B1	negative control
well C1	standard serum
well D1	standard serum
well E1	sample 1....

3. Sample incubation for 60 minutes (+/- 5 min) at 37°C (+/- 1°C) in moist chamber
4. After incubation wash all wells with washing solution (by automated washer or manually):

   aspirate or shake out the incubation solution

   fill each well with 300 µl washing solution

   aspirate or shake out the washing buffer

   repeat the washing procedure 3 times (altogether 4 times!)

   dry by tapping the microtest plate on a paper towel
5. Addition of conjugate: Add 100 µl of IgG-/IgM-/IgA-conjugate (ready-to-use) to the appropriate well (except

substrate blank)

6. Conjugate incubation for 30 minutes (+/- 1 min) * at 37°C (+/- 1°C) in moist chamber.
7. After incubation wash all wells with washing solution (see above)
8. Addition of substrate: Add 100 µl substrate solution (ready-to-use) to each well (including well for substrate blank!)
9. Substrate incubation for 30 minutes (+/- 1 min) * at 37°C (+/- 1°C) in moist chamber.
10. Stopping of the reaction: Add 100 µl stopping solution to each well, shake microtest plate gently to mix.
11. Read optical density: Read OD within 60 minutes at 405 nm against substrate blank, reference wave length between 620 nm and 690 nm (e.g. 650 nm).

***Please note, that under special working-conditions internal laboratory adaptations of the incubation times could be necessary.**

Calculation

1. Single-point quantification with the 4PL method

Optimized assignment of extinction signals to quantitative values is guaranteed by using non-linear functions, which adjust a sigmoide curve without any further transformation to OD-values. Determination of antibody concentrations with the ELISA is carried out by the logistic-log-model (4 PL; 4 parameter) which is ideal for exact curve-fitting. It is based on the formula:

$$OD = A + \frac{D - A}{1 + e^{B(C - \ln conc.)}}$$

The parameters A, B, C, and D are representative for the exact shape of the curve:

a. lower asymptote → parameter A

b. slope of the curve → parameter B

c. turning point → parameter C

d. upper asymptote → parameter D

For each lot the standard curve is evaluated by CD in several repeated test runs under optimal conditions. Time consuming and cost intensive construction of the standard curve by the user is not necessary.

For evaluation of antibody concentrations a lot specific standard curve as well as a lot specific evaluation table is included with each test kit. Appropriate evaluation software is available on request.

To compensate for normal test variations and also for test run control a standard serum is used in each individual test run. For this control serum a "reference value" with a validity range is determined by the quality control of the producer. Within this range a correct quantification of antibody concentration is ensured. Since the standard serum is not necessarily a positive control, the value of the standard serum may be borderline or negative in some ELISA tests.

2. Criteria of validity

the substrate blank must be OD < 0.25

the negative control must be negative

quantitative ELISA: the mean OD-value of the standard serum must be within the validity range, which is given on the lot specific quality control certificate of the kit (after subtraction of the substrate blank!)

qualitative ELISA: the mean OD-value of the positive control must be within the validity range, which is given on the lot specific quality control certificate of the kit (after subtraction of the substrate blank!)

the variation of OD-values may not be higher than 20%.

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

3. Non-automated evaluation

For the test evaluation a standard curve and an evaluation table are included in the test kit so that the obtained OD-values may be assigned to the corresponding antibody activity. The reference value and the validity range of the standard serum is given on the evaluation table (quality control certificate).

The blank (A1) must be subtracted from all OD-values prior to the evaluation.

Method 1: Qualitative Evaluation

To fix the cut-off ranges please multiply the mean value of the measured standard-OD with the numerical data of the certificate of quality control (see special case formulas), e.g.:

OD = 0.502 × MW (STD) with upper cut-off

OD = 0.352 × MW (STD) with lower cut-off

If the measured mean absorbance value of the standard serum is 0.64, the range of the cut-off is in between 0.225-0.321.

Method 2:

Continuous determination of antibody activities using the standard curve.

So called interassay variations (day to day deviations and laboratory to laboratory deviations) are compensated by multiplication of the current measured value obtained with a sample with the correction factor F. This factor is calculated as follows:

$$F = \frac{\text{OD-reference value (of standard serum)}}{\text{OD-current value (of standard serums)}}$$

The procedure is necessary to adjust the current level of the test of the user with the lotspecific standard curve.

First, daily deviations have to be corrected by calculating a factor (correction factor F):

a. The mean of the two OD-values of the standard serum has to be calculated and checked that it is within the given validity range.

b. Calculation of the factor "F": the given reference value is divided by the mean of the extinction of the standard serum: F = reference value extinction standard serum / mean value extinction standard serum.

c. All measured values of samples are multiplied by "F".

d. Antibody activities in IU/ml or U/ml can be determined from the standard curve with the corrected values.

Precautions

Evidence of deterioration

Only use CD reagents for test procedure, since all reagents are matched. In particular standard and control sera are defined exclusively for the test kit to be used.

Do not use reagents in other lots.

There are three different conjugate concentrations for each immunoglobulin class: LOW, MEDIUM, HIGH

The classification is written on each label as follows:

e.g. IgG + lowly concentrated IgG conjugate

IgG ++ medium concentrated IgG conjugate

IgG +++ highly concentrated IgG conjugate

In rare cases the use of special conjugate is necessary to guarantee consistent quality for our products. Special conjugates are produced in a separate lot and do not carry the "+" sign. Therefore, special conjugates are not exchangeable with other conjugates.

Please pay close attention to notifications on labels!

Unopened, all components of the kits may be used up to the dates given on the labels, if stored at +2°C to +8°C. Complete stability and storage data are described under "Storage".

Each reagent has been calibrated and optimized for the test. Dilution or alteration of these reagents may result in a loss of sensitivity.

Avoid exposure of reagents to strong light during storage and incubation. Reagents must be tightly closed to avoid evaporation and contamination with microorganisms since incorrect test results could occur due to interference from proteolytic enzymes.

To open the press-seal bag please cut off the top of the marked side, only. Do not use the strips if the aluminum bag is damaged or if the press-seal bag with remaining strips and desiccant was not properly reclosed.

Bring all reagents to room temperature before testing.

Use aseptic techniques for removing aliquots from the reagent tubes to avoid contamination. To avoid false positive results ensure not to contact or sprinkle the topwalls of wells while pipetting conjugate. Take care not to mix the caps of the bottles and/or vials.

Reproducibility is dependent on thorough mixing of the reagents. Shake the flasks containing control sera before use and also all samples after dilution (e.g. by using a vortex mixer).

Be sure to pipette carefully and comply with the given incubation times and temperatures.

Significant time differences between pipetting the first and last well of the microtiter plate when filling samples/control sera, conjugate or substrate may result in different "pre incubation" times, which may influence the precision and reproducibility of the results.

Optimum results can only be achieved if ELISA instructions are followed strictly.

The test is not valid, if the lot-specific validation criteria on the quality control certifcate are not fulfilled.

Inadequate washing will affect the test results:

The washing procedure should be carried out carefully. If the washing procedure is carried out automatically follow the instruction manual of the respective washer. Flat bottom wells are used for ELISA. All wells should be filled with equal volumes of washing buffer. At the end of the procedure ensure that the wells are free of all

washing buffer by tapping the inverted microtest plate on a paper towel. Avoid foam! Do not scratch coated wells during washing and aspiration. If using an automated washer, ensure it is operating correctly.

Statements of warning

The ELISA is only designed for qualified personnel who are familiar with good laboratory practice.

All kit reagents and human specimens should be handled carefully, using established good laboratory practice.

1. This kit contains human blood components. Although all control- and cut-off-sera have been tested and found negative for HBs-Ag-, HCV- and HIV-antibodies, they should be considered potentially infectious.

2. Do not pipette by mouth.

3. Do not smoke, eat or drink in areas in which specimens or kit reagents are handled.

Wear disposable gloves, laboratory coat and safety glasses while handling kit reagents or specimens. Wash hands thoroughly afterwards.

Samples and other potentially infectious material should be decontaminated after the test run.

Reagents should be stored safely and be unaccessible to unauthorized access e.g. children.

Stopping solution: corrosive (C); causes acid burn (R34) use safety glasses, gloves and laboratory coat while handling!