Version 22-04/24

User's Manual

Varicella-Zoster Virus IgM ELISA Kit

REF **DEIA389**

Σ **96T**

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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.

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PRODUCT INFORMATION

Intended Use

Varicella-Zoster Virus IgM ELISA Kit is quantitative and qualitative tests for detection of human antibodies in serum, plasma or cerebrospinal fluid against Varicella-Zoster Virus. For Research Use Only. Not for use in diagnostic procedures.

General Description

Varicella-Zoster Viruses as well as Herpes-Simplex Viruses, CMV and EBV belong to the group of human Herpes viruses. This highly contagious virus is transmitted by droplet-infection (contaminated aerosols) or by smear-infection (vesicles with contaminated contents, or eschar). Varicella viruses are globally spread. Accumulating seasonal infections during winter and spring periods can be observed in temperate zones. Most pre-school children experience a primary infection, and 95% of adults show seropositivity. Contagion of infected patients starts 1-2 days before the onset of exanthema and ends towards the 7th day after the last efflorescence occurred. Pathogens persist in spinal ganglia and in cases of decreasing immunity they may be reactivated. The incubation period is 2-3 weeks. After a short prodromal period with non-specific symptoms, the primary manifestation of VZV-infection (chickenpox) appears. In general, the course of disease is benign except in cases of immunocompromised or elderly individuals and children younger than 1 year. Bacterial super infections, varicella pneumonia, various CNS-manifestations such as encephalitis, aseptic meningitis, Guillain-Barré-syndrome, Reye-syndrome, myocarditis, glomerulonephritis, inflammation of the gastro intestinal tract and hepatitis are some of the most severe complications resulting from VZV infections. In case of primary infections during pregnancy, diaplacental transmission may lead to congenital varicella syndrome. Infections occurring shortly before and after birth are a severe risk for the child. Reactivation of persisting viruses can lead to cases of herpes zoster (shingles). Most herpes zoster patients suffer from unilateral vesicular eruptions accompanied by severe pain. Post herpetic neuralgia may persist for a long period of time. Severe cases of zoster disease prevalently occur in cases of immunodeficiency. The method of choice for direct virus detection is VZV-polymerase-chain-reaction (PCR). Herpes Zoster may also be diagnosed serologically. For the detection of VZV specific IgM, ELISA is the method of choice. With the Varicella-Zoster Virus IgM ELISA Kit, evaluation of antibody activity is measured in international Units and, therefore, comparison of results from different tests is possible.

Principles of Testing

Microtiter wells are coated with antigens. This constitutes the solid phase. Sample is added to the wells and the antibodies specific for the antigen present will bind to the solid phase. After removal of unbound material, anti-human IgM 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

Test components	amount / volume
Break apart microtiter test strips each with 8 antigen coated single wells (altogether 96), 1 frame the coating material is inactivated	12
Standard serum (ready-to-use) Human serum in phosphate buffer with protein; negative for anti-HIV-Ab, anti-HBs-Ag (Hepatitis B-Virus-surface antigen) and anti-HCV-Ab; preservative: < 0.1 % sodium azide colouring: Amaranth O	2 x 2 ml
Negative control serum (ready-to-use) Human serum in phosphate buffer with protein; negative for anti-HIV-Ab, anti-HBs-Ag (Hepatitis B-Virus-surface antigen) and anti-HCV-Ab; preservative: < 0.1 % sodium azide colouring: Lissamin green V	2 ml
Anti-human-IgM-conjugate (ready-to-use) Anti-human-IgM from goat (polyclonal), conjugated to alkaline phosphatase, stabilized with protein stabilization solution preservative: 0.01 % methylisothiazolone, 0.01 % bromnitrodioxane	13 ml
Washing solution concentrate (sufficient for 1000ml) Sodium chloride solution with Tween 20, 30 mM Tris preservative: < 0.1 % sodium azide	33.3 ml
Dilution buffer Phosphate buffer with protein and Tween 20; preservative: < 0.1 % sodium azide 0.01 g/l Bromphenol blue sodium salt	2 x 50ml
Stopping solution 1.2 N sodium hydroxide	15 ml
Substrate (ready-to-use) Para-nitrophenylphosphate, solvent free buffer preservative: < 0.1 % sodium azide **(Substrate in unopened bottle may have a slightly yellow color. This does not reduce the quality of the product!)**	13 ml
Quality control certificate with standard curve and evaluation table (quantification of antibodies in IU/ml or U/ml)	1

Materials Required But Not Supplied

1. common laboratory equipment
2. Special SERION Rf-Absorbent with control antigen(Rf-absorbent CAg, order no. T 200, 20ml)
3. photometer for microtiter plates with filter, wavelength 405 nm, recommended reference wavelength 620 nm - 690 nm (e.g. 650 nm)
4. incubator 37°C

5. moist chamber
6. distilled water

Storage

Reagent	Storage	Stability
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!*	4 weeks
control sera / standard sera	after opening at 2-8°C	until expiry date; 24 months from date of production
conjugate	ready-to-use solution, at 2-8°C *Avoid contamination (sterile tips!)*	until expiry date 28 months from date of production
dilution buffer	after opening at 2-8°C *Discard cloudy solutions!* unopened	24 months until expiry date; 36 months from date of production
washing solution	concentrate after opening at 2-8°C working dilution at 2-8°C working dilution at room temperature *Bottles used for the working dilution should be cleaned regularly, discard cloudy solutions.*	until expiry date 2 weeks 1 week
substrate	ready-to-use solution at 2-8°C, protected from light! *Avoid contamination (sterile tips!) Discard when solution turns yellow (extinction against distilled water. > 0.25).*	until expiry date 24 months from date of production
stopping solution	after opening at room temperature	until expiry date

Specimen Collection And Preparation

Note:

1. 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 used due to the risk of wrong results.

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

Sample preparation

Rheumatoid factors are **autoantibodies mainly of the IgM-class,** which preferably bind to IgG-immune-complexes. The presence of non-specific IgM-antibodies (rheumatoid factors) can lead to false-positive results in the IgM-assay. Furthermore, the possibility exists, that weak-binding pathogen-specific IgM-antibodies are displaced by stronger-binding IgG-antibodies. In this case, IgM-detection can lead to false-negative results. Therefore it is necessary to pretreat samples with rheumatoid factor-absorbent prior to IgM detection. **A special rheumatoid factor (Rf)-absorbent** including anti-human-IgG antibodies and a defined amount of control antigen, simultaneously binds rheumatoid factors and antibodies, which are directed against membrane components of the host cell. Therefore, an extra test procedure in wells, which are coated with control antigen, is not necessary.

This Rf-absorbent has to be ordered separately for the following SERION ELISA classic IgM-Tests:

Cytomegalovirus, Herpes Simplex Virus, Measles Virus, Parotitis Virus, Rubella Virus, Toxoplasma gondii, Varicella-Zoster Virus.

Before running the test, rheumatoid factor-absorbent (Rf-absorbent/CAg) (V1) must be diluted 1+4 in dilution buffer (V2).

$V_1 + V_2 = 1 + 4$	add	200 µl	Rf-absorbent/CAg
	each to 800 µl		dilution buffer

Samples (V4) must be diluted in this Rf-dilution buffer (V3)

$V_4 + V_3 = 1 + 100$	add	10 µl	sample
	each to 1000 µl		Rf-dilution buffer

Sample storage

1. The stoppered samples can be stored in a refrigerator up to 7 days at 2-8°C. Extended storage is possible at ≤ -20°C.
2. Avoid repeated freezing and thawing of samples.
3. Diluted samples can be stored at 2-8°C for one week.

Reagent Preparation

1. Microtest strips: Microtest strips in a 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-IgM-AP-conjugate (ready-to-use): Please do not mix up conjugates from different kits. They

are optimized for each lot. 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)

6. Substrate (ready-to-use): To avoid contamination use gloves. 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.:

IgM quantitative antigen cavities	
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):

1) aspirate or shake out the incubation solution
2) fill each well with 300 µl washing solution
3) aspirate or shake out the washing buffer
4) repeat the washing procedure 3 times (altogether 4 times!)
5) dry by tapping the microtest plate on a paper towel

5. **Addition of conjugate:** Add 100 µl of IgM-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).

Calculation

The antibody activity specification in mIU/ml for IgM is refers to the WHO standard "International Standard for Varicella Zoster Immunoglobulin" which is declared with 50 international Units per phial.

1. 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.

Method1: 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 lot-specific standard curve.

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

1) 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.
2) 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.
3) All measured values of samples are multiplied by "F".
4) Antibody activities in U/ml or IU/ml can be determined from the standard curve with the corrected values.

2. Automatic test evaluation with CD easy base 4PL-Software/CD evaluate-Software

After input of the 4 parameters and the reference value of standard serum, antibody activities are calculated online. If the optical density of the standard is out of the valid range, the following message will appear:

CD easy base 4PL-Software:

"Standards are not in tolerance range" and/or "Distance between standards is greater than 20 %."

CD evaluate-Software:

"Standard values out of ranges in following groups: Group 1-24. Standard value differ more than 20% in following groups: Group 1-24."

In these cases the test run is invalid and should be repeated.

Parameters and reference value only need to be changed only if there is a change of lot (evaluation table shows parameters and reference values). Correct input of the lot specific data can be checked on the basis of the IU/ml or U/ml assigned to the standard serum. The calculated mean value of the units has to correspond to the unit value indicated on the lot specific certificate. There is an automatic correction of the measured values. In the standard version the printer displays the following:

sample code
OD-value
IU/ml or U/ml
evaluation

Evaluation

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 Varicella-Zoster Virus IgM ELISA Kit 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:

1. lower asymptote → parameter A
2. slope of the curve → parameter B
3. turning point → parameter C
4. 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.

Criteria of validity

1. the substrate blank must be OD < 0.25
2. the negative control must be negative
3. 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!)
4. 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!)
5. 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.

Precautions

1. Only use Varicella-Zoster Virus IgM ELISA Kit 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 them in other lots. Dilution buffer, washing solution and substrate solution can be used for all Varicella-Zoster Virus IgM ELISA Kit irrespective of the lot and the test.
2. There are three different conjugate concentrations for each immunoglobulin class: LOW, MEDIUM, HIGH. The classification is written on each label as follows:

   e.g. IgM + lowly concentrated IgM conjugate

   IgM ++ medium concentrated IgM conjugate

   IgM +++ highly concentrated IgM 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 wear the "+" sign. Therefore, special conjugates are not exchangeable with other conjugates.
3. Unopened, all components of the Varicella-Zoster Virus IgM ELISA Kit may be used up to the dates given on the labels, if stored at +2°C to +8°C. Complete stability and storage datas are described in "Storage".
4. Each reagent has been calibrated and optimized for the test. Dilution or alteration of these reagents may result in a loss of sensitivity.
5. 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.
6. 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.
7. Bring all reagents to room temperature before testing.

8. 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 top-walls of wells while pipetting conjugate. Pay attention not to mix the caps of the bottles and/or vials.
9. Reproducibility depends 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 monomixer).
10. 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 "preincubation" times, which may influence the precision and reproducibility of the results.
11. Optimum results can only be achieved if Varicella-Zoster Virus IgM ELISA Kit instructions are followed strictly.
12. The test is not valid, if the lot-specific validation criteria on the quality control certificate are not fulfilled.
13. 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 Varicella-Zoster Virus IgM ELISA Kit. 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.
14. The Varicella-Zoster Virus IgM ELISA Kit 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.
15. 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.
16. Do not pipette by mouth.
17. Do not smoke, eat or drink in areas in which specimens or kit reagents are handled.
18. Wear disposable gloves, laboratory coat and safety glasses while handling kit reagents or specimen. Wash hands thoroughly afterwards.
19. Samples and other potentially infectious material should be decontaminated after the test run.
20. Reagents should be stored safely and be unaccessible to unauthorized access e.g. children.
21. Stopping solution: corrosive ; causes acid burn; use safety glasses, gloves and laboratory coat while handling!

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