Instruction Manual

Borrelia burgdorferi IgA ELISA

Catalog number: 40-375-380011

Enzyme immunoassay based on microtiter plate for the detection and quantitative determination of human IgA antibodies against Borrelia burgdorferi in serum and plasma

Cat. No.: 40-375-380011
Storage: 4-8°C
For research use only

September 2009
Contents

1. Intended Use 3
2. General Information 3
3. Principle of the Test 3
4. Limitations, Precautions and General Comments 4
5. Reagents Provided 4
6. Materials Required but not Provided 5
7. Specimen Collection and Handling 6
8. Assay Procedure 6
9. Evaluation 7
10. Assay Characteristics 8
11. References 8
1. Intended Use
The GenWay Borrelia burgdorferi IgA antibody ELISA kit has been designed for the detection and the quantitative determination of specific IgA antibodies against Borrelia burgdorferi in serum and plasma. Further applications in other body fluids are possible and can be requested from the Technical Service of GenWay.

This assay is intended for research use only.

2. General Information
Borrelia burgdorferi belongs to the family of spirochetes, of which three types have been identified to be human pathogenic: Borrelia burgdorferi sensu stricto, B. afzelii and B. garinii. The endemic areas of Borrelia are in Central and Eastern Europe, as well as Russia, China and Japan. The illness is transferred via tick bites, in Europe mainly by Ixodes ricinus. In the endemic zones, like Southern Germany and Austria, up to 50% of the ticks are infected.

In the clinical course, after an erythema migrans, e.g. with neuroborreliosis, which appears at the first stage, also chronic arthritis, encephalitis, meningitis, myositis and hepatitis are observed. Treatment is done via different antibiotics, e.g. doxycyclin, amoxicillin, cefuroxim and penicillin G. A specific immunization is possible with immunophylaxis either by a recombinant OspA or by a recombinant polyvalent OspC vaccine.

The laboratory diagnosis is performed by the detection of antibodies in blood and cerebrospinal fluid. Methods employed are: ELISA, immunofluorescence, hemagglutination or Western blot. Besides whole cell extracts, recently there are increasingly used purified or recombinant single proteins as antigens. This brings however generally a decrease in sensitivity. It could be shown that between the various test methods there appear significant differences in the interpretation, so that the most reliable method seems to be the follow-up of the titer development. Western blot serves as a confirmatory test, because electrophoretically separated single antigens can be evaluated in their reaction with specific serum antibodies.

The GenWay Borrelia burgdorferi IgA ELISA test kit contains besides a whole cell antigen extract of Borrelia burgdorferi sensu stricto, which cross-reacts with Borrelia afzelii and Borrelia garinii, an addition of pure OspC, which increases the specificity and sensitivity of the assay. If the test shows only a positive IgA result (IgM negative), the immunity of the individual can be concluded. As mentioned above, in the case of a clearly positive clinical finding, there should be performed a confirmation of the titer increase with the same assay. With a positive IgM at the same time, there is a strong suspicion of an active disease.

3. Principle of the Test
The GenWay Borrelia burgdorferi IgA antibody test kit is based on the principle of the enzyme immunoassay (EIA). Borrelia burgdorferi 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 IgA antibodies of the serum and the immobilized Borrelia burgdorferi antigen takes place. After a one hour incubation at room temperature, the plate is rinsed with diluted wash solution, in order to remove unbound material. Then ready-to-use anti-human-IgA 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 development is 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 IgA 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. Before use, 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.

<table>
<thead>
<tr>
<th>Components</th>
<th>Volume / Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrelia burgdorferi antigen coated microtiter strips</td>
<td>12</td>
</tr>
<tr>
<td>Calibrator A (Negative Control)</td>
<td>2 mL</td>
</tr>
<tr>
<td>Calibrator B (Cut-Off Standard)</td>
<td>2 mL</td>
</tr>
<tr>
<td>Calibrator C (Weak Positive Control)</td>
<td>2 mL</td>
</tr>
<tr>
<td>Calibrator D (Positive Control)</td>
<td>2 mL</td>
</tr>
<tr>
<td>Enzyme Conjugate</td>
<td>15 mL</td>
</tr>
<tr>
<td>Substrate</td>
<td>15 mL</td>
</tr>
<tr>
<td>Stop Solution</td>
<td>15 mL</td>
</tr>
<tr>
<td>Sample Diluent</td>
<td>60 mL</td>
</tr>
<tr>
<td>Washing Buffer (10×)</td>
<td>60 mL</td>
</tr>
<tr>
<td>Plastic foils</td>
<td>2</td>
</tr>
<tr>
<td>Plastic bag</td>
<td>1</td>
</tr>
</tbody>
</table>

For research use only.
5.1. Mikrotiter Strips
12 strips with 8 breakable wells each, coated with a Borrelia burgdorferi antigen (Borrelia sensu stricto ATCC 35211 complete antigen, with addition of OSPC). Ready-to-use.

5.2. Calibrator A (Negative Control)
2 mL, protein solution diluted with PBS, contains no IgA antibodies against Borrelia burgdorferi. Addition of 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 IgA antibodies against Borrelia burgdorferi. 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 IgA antibodies against Borrelia burgdorferi. 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 IgA antibodies against Borrelia burgdorferi. Addition of 0.01 % methylisothiazolone and 0.01 % bromonitrodioxane. Ready-to-use.

5.6. Enzyme Conjugate
15 mL, anti-human-IgA-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 for 15 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

For research use only.
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 left at 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 afterwards removed 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 afterwards removed 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 blank is 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.

For research use only.
9. Evaluation

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

Example

<table>
<thead>
<tr>
<th></th>
<th>OD Value</th>
<th>corrected OD</th>
<th>Mean OD Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substrate Blank</td>
<td>0.010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Control</td>
<td>0.025 / 0.026</td>
<td>0.015 / 0.016</td>
<td>0.016</td>
</tr>
<tr>
<td>Cut-Off Standard</td>
<td>0.584 / 0.555</td>
<td>0.574 / 0.545</td>
<td>0.560</td>
</tr>
<tr>
<td>Weak Positive Control</td>
<td>1.112 / 1.030</td>
<td>1.102 / 1.020</td>
<td>1.061</td>
</tr>
<tr>
<td>Positive Control</td>
<td>1.834 / 1.931</td>
<td>1.824 / 1.921</td>
<td>1.873</td>
</tr>
</tbody>
</table>

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 value for 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 Adenovirus 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.

For research use only.
10. Assay Characteristics

<table>
<thead>
<tr>
<th>Borrelia burgdorferi ELISA</th>
<th>IgG</th>
<th>IgM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-Assay-Precision</td>
<td>4.8 %</td>
<td>5.0 %</td>
</tr>
<tr>
<td>Inter-Assay-Precision</td>
<td>7.7 %</td>
<td>9.0 %</td>
</tr>
<tr>
<td>Inter-Lot-Precision</td>
<td>2.8 – 10.6 %</td>
<td>4.8 – 10.3 %</td>
</tr>
<tr>
<td>Analytical Sensitivity</td>
<td>0.99 U/mL</td>
<td>0.99 U/mL</td>
</tr>
<tr>
<td>Recovery</td>
<td>79 – 88 %</td>
<td>110 – 111 %</td>
</tr>
<tr>
<td>Linearity</td>
<td>77 – 126 %</td>
<td>77 – 120 %</td>
</tr>
<tr>
<td>Cross-Reactivity</td>
<td>No cross-reactivity to TBEV (FSME)</td>
<td></td>
</tr>
<tr>
<td>Interferences</td>
<td>No interferences to bilirubin up to 0.3 mg/mL, hemoglobin up to 8.0 mg/mL und triglycerides up to 5.0 mg/mL.</td>
<td></td>
</tr>
<tr>
<td>Clinical Specificity</td>
<td>97 %</td>
<td>100 %</td>
</tr>
<tr>
<td>Clinical Sensitivity</td>
<td>88 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

11. References