Rubella Virus IgG ELISA

Enzyme immunoassay for the quantitative determination of IgG-class antibodies against Rubella Virus in human serum or plasma.

REF RE57081

Σ 96

2-8°C

For research use only. Not for use in diagnostic procedures.

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1. INTRODUCTION
Rubella is an enveloped RNA virus belonging to the toga viruses. It has a spherical shape measuring about 50-70 nm in diameter. There appears to be only one antigenic type, and no cross-reactivity with alpha viruses or other members of the toga virus group has been found. Rubella viruses are pathogens of the respiratory tract and transmitted mainly by droplet infection. Rubella is a worldwide common contagious disease with mild constitutional symptoms and a generalized rush. In childhood, it is an inconsequential illness, but when it occurs during pregnancy, there is a significant risk of severe damage to the foetus. The risk of congenital rubella depends primarily on the month of pregnancy in which infection is acquired: overall, app. 16% of infants have major defects at birth following maternal rubella in the first 3 months of pregnancy. Congenital rubella infection may lead to a syndrome with single or multiple organ involvements, known as embryopathy rubellosa. In some cases infection is inapparent but results in consequential damages as eye defects, deafness, growth retardation, and others. Naturally acquired immunity usually is long-lasting, but reinfection is possible due to decreasing levels of circulating antibodies. For immunization a vaccine containing live virus is used.

<table>
<thead>
<tr>
<th>Species</th>
<th>Disease</th>
<th>Symptoms</th>
<th>Mechanism of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubella Virus</td>
<td>acquired rubella</td>
<td>generalized rush (fever, nausea)</td>
<td>Transmission by close person-to-person contact, spread most probably by droplets via the respiratory tract</td>
</tr>
<tr>
<td></td>
<td>(German measles)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>congenital rubella syndrome</td>
<td>Cardiovascular lesions, eye defects, hearing impairment, CNS involvement and others</td>
<td>foetal infection: transmission by haematogenous spread during maternal viremia</td>
</tr>
<tr>
<td></td>
<td>(Embryopathia rubellosa)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Infection may be identified by:
- Detection of virus by PCR (prenatal)
- Hemagglutination inhibition (HAI), Haemolysis-in-gel test (HiG)
- Detection of antibodies by EIA, ELISA

2. INTENDED USE
The IBL Rubella virus IgG-ELISA is intended for the quantitative determination of IgG class antibodies against Rubella virus in human serum or plasma (citrate).

3. PRINCIPLE OF THE ASSAY
The quantitative immunoenzymatic determination of IgG-class antibodies against Rubella Virus is based on the ELISA (Enzyme-linked Immunosorbent Assay) technique. Microtiter strip wells are precoated with Rubella Virus antigens to bind corresponding antibodies of the specimen. After washing the wells to remove all unbound sample material horseradish peroxidase (HRP) labelled anti-human IgG conjugate is added. This conjugate binds to the captured Rubella-specific antibodies. The immune complex formed by the bound conjugate is visualized by adding Tetrathylammoniumbenzidine (TMB) substrate which gives a blue reaction product. The intensity of this product is proportional to the amount of Rubella specific IgG antibodies in the specimen. Sulphuric acid is added to stop the reaction. This produces a yellow endpoint colour. Absorbance at 450 nm is read using an ELISA microwell plate reader.

4. MATERIALS

4.1. Reagents supplied
- Rubella Virus Coated Wells (IgG): 12 breakapart 8-well snap-off strips coated with Rubella Virus antigen; in resealable aluminium foil.
- IgG Sample Diluent ***: 1 bottle containing 100 ml of buffer for sample dilution; pH 7.2 ± 0.2, coloured yellow; ready to use; white cap.
- Stop Solution: 1 bottle containing 15 ml sulphuric acid, 0.2 mol/L; ready to use; red cap.
- Washing Solution (20x conc.)*: 1 bottle containing 50 ml of a 20-fold concentrated buffer for washing the wells; pH 7.2 ± 0.2; white cap.
- Rubella Virus anti-IgG Conjugate**: 1 bottle containing 20 ml of peroxidase labelled antibodies to human IgG; coloured blue; ready to use; black cap.
- TMB Substrate Solution: 1 bottle containing 15 ml 3,3',5,5'-tetramethylbenzidine (TMB); ready to use; yellow cap.
- Rubella Virus IgG Standards***: 4 vials, each containing 2 ml; coloured yellow; ready to use:
  - Standard A: 0 IU/ml; blue cap
  - Standard B: 10 IU/ml; green cap
  - Standard C: 50 IU/ml; yellow cap
  - Standard D: 100 IU/ml; red cap
  - * contains 0.1 % Bronidox L after dilution
  - ** contains 0.2 % Bronidox L
  - *** contains 0.1 % Kathon

4.2. Materials supplied
- 1 Strip holder
- 1 Cover foil
- 1 Test protocol

4.3. Materials and Equipment needed
- ELISA microwell plate reader, equipped for the measurement of absorbance at 450/620 nm
- Incubator 37°C
- Manual or automatic equipment for rinsing wells
- Pipettes to deliver volumes between 10 and 1000 µl
- Vortex tube mixer
- Deionised or (freshly) distilled water
- Disposable tubes
- Timer
5. STABILITY AND STORAGE

The reagents are stable up to the expiry date stated on the label when stored at 2...8 °C.

6. REAGENT PREPARATION

It is very important to bring all reagents, samples and standards to room temperature (20...25°C) before starting the test run!

6.1. Coated Snap-off Strips

The ready to use breakapart snap-off strips are coated with Rubella Virus antigen. Store at 2...8°C. Immediately after removal of strips, the remaining strips should be resealed in the aluminium foil along with the desiccant supplied and stored at 2...8 °C; stability until expiry date.

6.2. Rubella Virus anti-IgG Conjugate

The bottle contains 20 ml of a solution with anti-human IgG horseradish peroxidase, buffer, stabilizers, preservatives and an inert blue dye. The solution is ready to use. Store at 2...8°C. After first opening stability until expiry date when stored at 2...8°C.

6.3. Standards

The vials labelled with Standard A, B, C and D contain a ready to use standard solution calibrated in accordance with the International Standard of the WHO.

The concentration of the standards are:

- Standard A: 0 IU/ml
- Standard B: 10 IU/ml
- Standard C: 50 IU/ml
- Standard D: 100 IU/ml

The solutions have to be stored at 2...8°C and contain 0.1% Kathon. After first opening stability until expiry date when stored at 2...8°C.

6.4. IgG Sample Diluent

The bottle contains 100 ml phosphate buffer, stabilizers, preservatives and an inert yellow dye. It is used for the dilution of the patient specimen. This ready to use solution has to be stored at 2...8°C. After first opening stability until expiry date when stored at 2...8°C.

6.5. Washing solution (20xconc.)

The bottle contains 50 ml of a concentrated buffer, detergents and preservatives. Dilute washing solution 1+19; e.g. 10 ml washing solution + 190 ml fresh and germ free redistilled water. The diluted buffer will keep for 5 days if stored at room temperature. Crystals in the solution disappear by warming up to 37 °C in a water bath. After first opening the concentrate is stable until the expiry date.

6.6. TMB Substrate Solution

The bottle contains 15 ml of a tetramethylbenzidine/hydrogen peroxide system. The reagent is ready to use and has to be stored at 2...8°C, away from the light. The solution should be colourless or could have a slight blue tinge. If the substrate turns into blue, it may have become contaminated and should be thrown away. After first opening stability until expiry date when stored at 2...8°C.

6.7. Stop Solution

The bottle contains 15 ml 0.2 M sulphuric acid solution (R 36/38, S 26). This ready to use solution has to be stored at 2 ... 8°C.

After first opening stability until expiry date.

7. SPECIMEN COLLECTION AND PREPARATION

Use human serum or plasma (citrate) samples with this assay. If the assay is performed within 5 days after sample collection, the specimen should be kept at 2...8°C; otherwise they should be aliquoted and stored deep-frozen (-20 to -70°C). If samples are stored frozen, mix thawed samples well before testing. Avoid repeated freezing and thawing.

Heat inactivation of samples is not recommended.

7.1. Sample Dilution

Before assaying, all samples should be diluted 1+100 with IgG Sample Diluent. Dispense 10µl sample and 1 ml IgG Sample Diluent into tubes to obtain a 1+100 dilution and thoroughly mix with a Vortex. Standards are ready to use and must not be diluted.

For patients with expected concentrations greater than Standard D (100 IU/ml) a second 1 + 10 dilution of this 1 + 100 diluted patient sample should be performed; e.g. 20 µl of first sample dilution + 200 µl of IgG sample diluent (mix well). Dilution factor: 11

8. ASSAY PROCEDURE

8.1. Test Preparation

Please read the test protocol carefully before performing the assay. Result reliability depends on strict adherence to the test protocol as described. The following test procedure is only validated for manual procedure. If performing the test on ELISA automatic systems we recommend to increase the washing steps from three to five and the volume of washing solution from 300µl to 350µl to avoid washing effects. Prior to commencing the assay, the distribution and identification plan for all specimens and controls should be carefully established on the result sheet supplied in the kit. Select the required number of microtiter strips or wells and insert them into the holder.

Please allocate at least:

1 well (e.g. A1) for the substrate blank,
4 wells (e.g. B1, C1, etc.) for Standard A, B, C and D.

It is recommended to determine patient samples in duplicate.

Perform all assay steps in the order given and without any appreciable delays between the steps.

A clean, disposable tip should be used for dispensing each control and sample.

Adjust the incubator to 37° ± 1°C.

1. Dispense 100µl of each Standard (A, B, C and D) and diluted samples into the respective wells. Leave well A1 for substrate blank.
2. Cover wells with the foil supplied in the kit.
3. Incubate for 1 hour ± 5 min at 37±1°C.
4. When incubation has been completed, remove the foil, aspirate the content off the wells and wash each well five times with 300µl of washing solution. Avoid overflows from the reaction wells. The soak time between each wash cycle should be >5 sec. At the end carefully remove remaining fluid by tapping strips on tissue paper prior to the next step!

Note: Washing is critical! Insufficient washing results in poor precision and falsely elevated absorbance values.
5. Dispense 100µl Rubella Virus anti-IgG Conjugate into all wells except for the blank well (e.g. A1). Cover with foil.
6. Incubate for 30 min 37±1°C.
7. Repeat step 4.
8. Dispense 100µl TMB Substrate Solution into all wells
9. Incubate for exactly 30 min at room temperature (20...25°C) in the dark.
10. Dispense 100µl Stop Solution into all wells in the same order and at the same rate as for the TMB Substrate Solution. Any blue colour developed during the incubation turns into yellow.

Note: Highly positive patient samples can cause dark precipitates of the chromogen! These precipitates have an influence when reading the optical density. Predilution of the sample - as described under 7.1. Sample Dilution - is recommended.
11. Measure the absorbance of the specimen at 450/620 nm within 30 min after addition of the Stop Solution.

8.2. Measurement
Adjust the ELISA Microwell Plate Reader to zero using the substrate blank in well A1.

If - due to technical reasons - the ELISA reader cannot be adjusted to zero using the substrate blank in well A1, subtract the absorbance value of well A1 from all other absorbance values measured in order to obtain reliable results!

Measure the absorbance of all wells at 450 nm and record the absorbance values for each control and patient sample in the distribution and identification plan. Dual wavelength reading using 620 nm as reference wavelength is recommended.

Where applicable calculate the mean absorbance values of all duplicates.

9. RESULTS

9.1. Assay Validation Criteria
In order for an assay to be considered valid, the following criteria must be met:

- Substrate blank in A1: Absorbance value lower than 0.100.
- Standard A in B1: Absorbance < 0.200
- Standard B in C1: Absorbance > 0.200
- Standard C in D1: Absorbance > 0.700
- Standard D in E1: Absorbance > 1.100

Standard A < Standard B < Standard C < Standard D

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

9.2. Calculation of Results
In order to obtain quantitative results in IU/ml plot the (mean) absorbance values of the 4 Standards A, B, C and D on (linear/linear) graph paper in a system of coordinates against their corresponding concentrations (0, 10, 50 and 100 IU/ml) and draw a standard calibration curve (absorbance values on the vertical y-axis, concentrations on the horizontal x-axis).

Read results from this standard curve employing the (mean) absorbance values of each patient specimen and control.

NOTE: Readings of additionally (1+10) diluted patient samples must be multiplied by the appropriate dilution factor in order to obtain correct results! (Dilution: 1+10 = Dilution factor: 11). (See chapter “Sample Dilution, 7.1.”).

9.3. Typical Calibration Curve

9.4. Interpretation of Results
Normal value ranges for this ELISA should be established by each laboratory based on its own patient populations in the geographical areas serviced.

The following values should be considered as a guideline:

Reactive: > 15 IU/ml
Grey zone (equivocal): 10 - 15 IU/ml
Non reactive: < 10 IU/ml
10. SPECIFIC PERFORMANCE CHARACTERISTICS

10.1. Precision

<table>
<thead>
<tr>
<th>Intraassay</th>
<th>n</th>
<th>Mean value</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard B</td>
<td>6</td>
<td>0.54</td>
<td>7.9</td>
</tr>
<tr>
<td>Standard C</td>
<td>6</td>
<td>1.73</td>
<td>3.4</td>
</tr>
<tr>
<td>Standard D</td>
<td>6</td>
<td>2.34</td>
<td>2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interassay</th>
<th>n</th>
<th>Mean value</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard B</td>
<td>8</td>
<td>0.50</td>
<td>7.6</td>
</tr>
<tr>
<td>Standard C</td>
<td>6</td>
<td>1.64</td>
<td>4.6</td>
</tr>
<tr>
<td>Standard D</td>
<td>6</td>
<td>2.19</td>
<td>6.3</td>
</tr>
</tbody>
</table>

10.2. Diagnostic Specificity

The diagnostic specificity is defined as the probability of the assay of scoring negative in the absence of the specific analyte.

It is >98%.

10.3. Diagnostic Sensitivity

The diagnostic sensitivity is defined as the probability of the assay of scoring positive in the presence of the specific analyte.

It is >98%.

10.4. Analytical Sensitivity

The analytical sensitivity – defined as the apparent concentration of the analyte that can be distinguished from the zero calibrator – is 1.0 IU/ml.

10.5. Interferences

Interferences with hemolytic, lipemic or icteric sera are not observed up to a concentration of 10 mg/ml hemoglobin, 5 mg/ml triglycerides and 0.5 mg/ml bilirubin.

Note: The results refer to the groups of samples investigated; these are not guaranteed specifications.

11. LIMITATIONS OF THE PROCEDURE

Bacterial contamination or repeated freeze-thaw cycles of the specimen may affect the absorbance values. Diagnosis of an infectious disease should not be established on the basis of a single test result. A precise diagnosis should take into consideration clinical history, symptomatology as well as serological data. In immunocompromized patients and newborns serological data only have restricted value.

12. PRECAUTIONS AND WARNINGS

- In compliance with article 1 paragraph 2b European directive 98/79/EC the use of the 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 testkits with analyzers 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.
- Only for in-vitro diagnostic use.
- All components of human origin used for the production of these reagents have been tested for anti-HIV antibodies, anti-HCV antibodies and HBsAg and have been found to be non-reactive. Nevertheless, all materials should still be regarded and handled as potentially infectious.
- Do not interchange reagents or strips of different production lots.
- No reagents of other manufacturers should be used along with reagents of this test kit.
- Do not use reagents after expiry date stated on the label.
- Use only clean pipette tips, dispensers, and lab ware.
- Do not interchange screw caps of reagent vials to avoid cross-contamination.
- Close reagent vials tightly immediately after use to avoid evaporation and microbial contamination.
- After first opening and subsequent storage check conjugate and control vials for microbial contamination prior to further use.
- To avoid cross-contamination and falsely elevated results pipette patient samples and dispense conjugate without splashing accurately to the bottom of wells.
- The ELISA is only designed for qualified personnel who are familiar with good laboratory practice.

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!

12.1. Disposal Considerations

Residues of chemicals and preparations are generally considered as hazardous waste. The disposal of this kind of waste is regulated through national and regional laws and regulations. Contact your local authorities or waste management companies which will give advice on how to dispose hazardous waste.
BIBLIOGRAPHY


SCHEME OF THE ASSAY
Rubella Virus IgG-ELISA

Assay Preparation

Prepare reagents and samples as described.
Establish the distribution and identification plan for all specimens and standards on the result sheet supplied in the kit.
Select the required number of microtiter strips or wells and insert them into the holder.

Assay Procedure

<table>
<thead>
<tr>
<th>Substrate blank (e.g. A1)</th>
<th>Standard A</th>
<th>Standard B</th>
<th>Standard C</th>
<th>Standard D</th>
<th>Sample (diluted 1+100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard A</td>
<td>100µl</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Standard B</td>
<td>-</td>
<td>100µl</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Standard C</td>
<td>-</td>
<td>-</td>
<td>100µl</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Standard D</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100µl</td>
<td>-</td>
</tr>
<tr>
<td>Sample (diluted 1+100)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100µl</td>
</tr>
</tbody>
</table>

Cover wells with foil supplied in the kit

**Incubate for 1 h at 37°C**
Wash each well three times with 300µl of washing solution

<table>
<thead>
<tr>
<th>Conjugate</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
</tr>
</thead>
</table>

Cover wells with foil supplied in the kit

**Incubate for 30 min 37±1°C**.
Wash each well three times with 300µl of washing solution

<table>
<thead>
<tr>
<th>TMB Substrate</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
</tr>
</thead>
</table>

**Incubate for 30 min at room temperature in the dark**

<table>
<thead>
<tr>
<th>Stop Solution</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
<th>100µl</th>
</tr>
</thead>
</table>

Photometric measurement at 450 nm (reference wavelength: 620 nm)
Symbols / Symbole / Symbôles / Símbolos / Σύµβολα

**REF**
Cat.-No.: / Kat.-Nr.: / No.- Cat.: / Cat.-No.: / N.º Cat.: / N.–Cat.: / Αριθµός-Κατ.:

**LOT**
Lot-No.: / Chargen-Bez.: / No. Lot: / Lot-No.: / Lote N.º: / Lotto n.: / Αριθµός-Παραγωγή:

**Use by:** / Verwendbar bis: / Utiliser à: / Usado por: / Usar até: / Da utilizzare entro: / Χρησιµοποιείται από:


**CONC**
Concentrate / Konzentrat / Concentré / Concentrar / Concentrado / Concentrato / Συµπύκνωµα

**LYO**
Lyophilized / Lyophilisat / Lyophilisé / Liofilizado / Liofilizzato / Λυοφιλιασµένο

**IVD**
In Vitro Diagnostic Medical Device. / In-vitro-Diagnostikum. / Appareil Médical pour Diagnostics In Vitro. / Equipo Médico para Diagnóstico In Vitro. / Dispositivo Medico Diagnostico In vitro. / Ιατρική συσκευή για In-Vitro Διάγνωση.

**Evaluation kit.** / Nur für Leistungsbewertungszwecke. / Kit pour évaluation. / Juego de Reactivos para Evaluación. / Kit de avaliação. / Kit di evaluazione. / Κιτ Αξιολόγησης.

**Read instructions before use.** / Arbeitsanleitung lesen. / Lire la fiche technique avant emploi. / Lea las instrucciones antes de usar. / Ler as instruções antes de usar. / Leggere le istruzioni prima dell’uso. / Διαβάστε τις οδηγίες πριν την χρήση.

**Keep away from heat or direct sun light.** / Vor Hitze und direkter Sonneneinstrahlung schützen. / Garder à l’abri de la chaleur et de toute exposition lumineuse. / Manténgase alejado del calor o la luz solar directa. / Non esporre ai raggi solari. / Να φυλάσσεται µακριά από θερµότητα και άµεση επαφή µε το φως του ηλίου.

**Store at:** / Lagern bei: / Stocker à: / Almacenar a: / Armazenar a: / Conservare a: / Αποθήκευση στους:

**Manufacturer:** / Hersteller: / Fabricant: / Productor: / Fabricante: / Fabricante: / Fabbricante: / Παραγωγός:

**Caution!** / Vorsicht! / Attention! / ¡Precaución! / Cuidado! / Attenzione! / Προσοχή!

Symbols of the kit components see MATERIALS SUPPLIED.

Die Symbole der Komponenten sind im Kapitel KOMPONENTEN DES KITS beschrieben.

Voir MATERIEL FOURNI pour les symboles des composants du kit.

Símbolos de los componentes del juego de reactivos, vea MATERIALES SUMINISTRADOS.

Para símbolos dos componentes do kit ver MATERIAIS FORNECIDOS.

Per i simboli dei componenti del kit si veda COMPONENTI DEL KIT.

Για τα σύµβολα των συστατικών του κιτ συµβουλευτείτε το ΠΑΡΕΧΟΜΕΝΑ ΥΛΙΚΑ.

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**LIABILITY:** Complaints will only be accepted in written and if all details of the test performance and results are included (complaint form available from IBL or supplier). Any modification of the test procedure or exchange or mixing of components of different lots could negatively affect the results. These cases invalidate any claim for replacement. Regardless, in the event of any claim, the manufacturer’s liability is not to exceed the value of the test kit. Any damage caused to the kit during transportation is not subject to the liability of the manufacturer.

Symbols Version 3.5 / 2010-11-01