



Instructions for Use

Tetanus toxin IgG ELISA RUO

RUO

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For Research Use Only

Not for use in diagnostic procedures

1 INTRODUCTION

1.1 Intended Use

The **DRG Tetanus toxin IgG Enzyme Immunoassay Kit** provides materials for the **quantitative** determination of IgG-class antibodies to Tetanus toxin in human serum or plasma (EDTA, lithium heparin or citrate plasma).

This assay is intended for research use only.

2 PRINCIPLE OF THE TEST

The **DRG Tetanus toxin IgG ELISA** Kit is a solid phase enzyme-linked immunosorbent assay (ELISA).

Microtiter wells as a solid phase are coated with Tetanus toxoid antigen.

Diluted specimens and **ready-for-use controls** are pipetted into these wells. During incubation Tetanus toxin-specific antibodies of positive specimens and controls are bound to the immobilized antigens.

After a washing step to remove unbound sample and control material horseradish peroxidase conjugated anti-human IgG antibodies are dispensed into the wells. During a second incubation this anti-IgG conjugate binds specifically to IgG antibodies resulting in the formation of enzyme-linked immune complexes.

After a second washing step to remove unbound conjugate the immune complexes formed (in case of positive results) are detected by incubation with TMB substrate and development of a blue color. The blue color turns into yellow by stopping the enzymatic indicator reaction with sulfuric acid.

The intensity of this color is directly proportional to the amount of Tetanus toxin-specific IgG antibody in the specimen.

Optical density at 450 nm is read using an ELISA microtiter plate reader.

3 WARNINGS AND PRECAUTIONS

- This kit is for in research use only. For professional use only.
- Before starting the assay, read the instructions completely and carefully. Use the valid version of the package insert provided with the kit. Be sure that everything is understood.
- All reagents of this test kit which contain human serum or plasma have been tested and confirmed negative for HIV I/II, HBsAg and HCV by FDA approved procedures. All reagents, however, should be treated as potential biohazards in use and for disposal.
- Avoid contact with Stop Solution containing 0.2 mol/L H₂SO₄. It may cause skin irritation and burns.
- TMB substrate has an irritant effect on skin and mucosa. In case of possible contact, wash eyes with an abundant volume of water and skin with soap and abundant water. Wash contaminated objects before reusing them. If inhaled, take the person to open air.
- The microplate contains snap-off strips. Unused wells must be stored at 2 °C to 8 °C in the sealed foil pouch and used in the frame provided
- Pipetting of samples and reagents must be done as quickly as possible and in the same sequence for each step.
- Use reservoirs only for single reagents. This especially applies to the substrate reservoirs. Using a reservoir for dispensing a substrate solution that had previously been used for the conjugate solution may turn solution colored. Do not pour reagents back into vials as reagent contamination may occur.
- Mix the contents of the microplate wells thoroughly to ensure good test results. Do not reuse microwells.
- Do not let wells dry during assay; add reagents immediately after completing the rinsing steps.
- Allow the reagents to reach room temperature (21 °C – 26 °C) before starting the test. Temperature will affect the optical density readings of the assay. However, values for the samples will not be affected.
- Never pipette by mouth and avoid contact of reagents and specimens with skin and mucous membranes.
- Do not smoke, eat, drink or apply cosmetics in areas where specimens or kit reagents are handled.
- Wear disposable latex gloves when handling specimens and reagents. Microbial contamination of reagents or specimens may give false results.
- Handling should be in accordance with the procedures defined by an appropriate national biohazard safety guideline or regulation.
- Do not use reagents beyond expiry date as shown on the kit labels.
- All indicated volumes have to be performed according to the protocol. Optimal test results are only obtained when using calibrated pipettes and microtiter plate readers.
- Do not mix or use components from kits with different lot numbers. It is advised not to exchange wells of different plates even of the same lot. The kits may have been shipped or stored under different conditions and the binding characteristics of the plates may result slightly different.
- Chemicals and prepared or used reagents have to be treated as hazardous waste according the national biohazard safety guideline or regulation.
- For information on hazardous substances included in the kit please refer to Safety Data Sheets. Safety Data Sheets for this product are available upon request directly from DRG.

4 KIT COMPONENTS

4.1 Contents of the Kit

1. **Microtiterwells**, 12 x 8 (break apart) strips, 96 wells;
Wells coated with Tetanus toxoid antigen.
(incl. cover foil)
 2. **Sample Diluent** *, 1 vial, 100 mL, ready to use,
colored yellow; pH 7.2 ± 0.2 .
 3. **Standard (Standard 1 - 3)***, 3 vials, S1, S2 and S3 with 2.0 mL, ready to use;
Concentrations: 0.2 – 0.5 – 1.0 IU/mL,
Standard 1, colored green, green cap
Standard 2, colored blue, blue cap
Standard 3, colored red, red cap
 4. **Neg. Control** *, 1 vial, 2.0 mL, ready to use;
colored yellow, yellow cap.
 5. **Pos. Control** *, 1 vial, 2.0 mL, ready to use;
colored purple, black cap
 6. **Enzyme Conjugate** *, 1 vial, 20 mL, ready to use,
colored red,
antibody to human IgG conjugated to horseradish peroxidase.
 7. **Substrate Solution**, 1 vial, 14 mL, ready to use,
Tetramethylbenzidine (TMB).
 8. **Stop Solution**, 1 vial, 14 mL, ready to use,
contains 0.2 mol/L H_2SO_4 ,
Avoid contact with the stop solution. It may cause skin irritations and burns.
 9. **Wash Solution** *, 1 vial, 30 mL (20X concentrated for 600 mL), pH 6.5 ± 0.1
see „Preparation of Reagents“.
- * contain non-mercury preservative

4.1.1 Equipment and material required but not provided

- A microtiter plate calibrated reader (450 nm/620 nm ± 10 nm)
(e.g. the DRG Instruments Microtiter Plate Reader)
- Calibrated variable precision micropipettes
- Incubator 37 °C
- Manual or automatic equipment for rinsing wells
- Vortex tube mixer
- Deionized or (freshly) distilled water
- Timer
- Absorbent paper

4.2 Storage Conditions and stability of the Kit

When stored at 2 °C to 8 °C unopened reagents will retain reactivity until expiration date. Do not use reagents beyond this date.

Opened reagents must be stored at 2 °C to 8 °C. Microtiter wells must be stored at 2 °C to 8 °C. Once the foil bag has been opened, care should be taken to close it tightly again.

Opened kits retain activity for 8 weeks if stored as described above.

4.3 Reagent Preparation

Allow all reagents and required number of strips to reach room temperature (20 °C to 25 °C) prior to use.

Wash Solution

Dilute **Wash Solution 1+19** (e.g. 10 mL + 190 mL) with fresh and germ free redistilled water. This diluted wash solution has a pH value of 7.2 ± 0.2 .

Consumption: ~ 5 mL per determination.

Crystals in the solution disappear by warming up to 37 °C in a water bath. Be sure that the crystals are completely dissolved before use.

The diluted Wash Solution is stable for 4 weeks at 2 °C to 8 °C.

4.4 Disposal of the Kit

The disposal of the kit must be made according to the national regulations. Special information for this product is given in the Safety Data Sheets.

4.5 Damaged Test Kits

In case of any severe damage to the test kit or components, DRG has to be informed in writing, at the latest, one week after receiving the kit. Severely damaged single components should not be used for a test run. They have to be stored until a final solution has been found. After this, they should be disposed according to the official regulations.

5 SPECIMEN

Serum or plasma (EDTA-, heparin- or citrate plasma) can be used in this assay.

In general it should be avoided to use hemolytic, icteric or lipemic specimens. For further information refer to chapter "Interfering Substances".

5.1 Specimen Collection

Serum:

Collect blood by venipuncture (e.g. Sarstedt Monovette for serum), allow to clot, and separate serum by centrifugation at room temperature. Do not centrifuge before complete clotting has occurred. Samples containing anticoagulant may require increased clotting time.

Plasma:

Whole blood should be collected into centrifuge tubes containing anti-coagulant (e.g. Sarstedt Monovette with the appropriate plasma preparation) and centrifuged immediately after collection.

5.2 Specimen Storage and Preparation

Specimens should be capped and may be stored for up to 5 days at 2 °C to 8 °C prior to assaying.

Specimens held for a longer time (up to 12 months) should be frozen only once at -20 °C prior to assay. Thawed samples should be inverted several times prior to testing.

5.3 Specimen Dilution

Prior to assaying dilute each specimen **1+100** with *Sample Diluent*, e.g. 10 µL of specimen + 1 mL of *Sample Diluent*. Mix well.

For samples with expected concentrations greater than Standard 3 (1.0 IU/mL) a second 1:10 dilution of this 1+100 diluted sample should be performed;

e.g. 20 µL of first sample dilution + 180 µL Sample Diluent (mix well).

Please note: Standards and Controls are ready for use and must not be diluted!

6 ASSAY PROCEDURE

6.1 General Remarks

- **It is very important to bring all reagents, samples and controls to room temperature before starting the test run!**
- Once the test has been started, all steps should be completed without interruption.
- Use new disposal plastic pipette tips for each standard, control or sample in order to avoid cross contamination.
- Optical density is a function of the incubation time and temperature. Before starting the assay, it is recommended that all reagents are ready, caps removed, all needed wells secured in holder, etc. This will ensure equal elapsed time for each pipetting step without interruption.
- As a general rule the enzymatic reaction is linearly proportional to time and temperature.
- Close reagent vials tightly immediately after use to avoid evaporation and microbial contamination.
- To avoid cross-contamination and falsely elevated results pipette samples and dispense conjugate without splashing accurately to the bottom of wells.
- During 37 °C incubation cover microtiter strips with foil to avoid evaporation.

6.2 Assay Procedure

Prior to commencing the assay, the **distribution and identification plan** for all specimens and controls should be carefully established on a form supplied in the kit.

1. 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 <i>Neg. Control</i> ,
4 wells	(e.g. from B1 on)	for the <i>Standard 1-3</i>
1 well	(e.g. F1)	for the <i>Pos. Control</i>

It is left to the user to determine controls and samples in duplicate.

2. Dispense

100 µL of <i>Neg. Control</i>	into well A1
100 µL of <i>Standard 1</i>	into well B1 + C1
100 µL of <i>Standard 2</i>	into well D1
100 µL of <i>Standard 3</i>	into well E1
100 µL of <i>Pos. Control</i>	into well F1 and
100 µL of each diluted sample	<u>with new disposable tips</u> into appropriate wells.

3. Cover wells with foil supplied in the kit. Incubate for **60 minutes at 37 °C**.
4. Briskly shake out the contents of the wells.
Rinse the wells **5 times** with diluted *Wash Solution* (**300 µL per well**). Strike the wells sharply on absorbent paper to remove residual droplets.
Important note:
The sensitivity and precision of this assay is markedly influenced by the correct performance of the washing procedure!
5. Dispense **100 µL Enzyme Conjugate** into each well.
6. Incubate for **30 minutes at room temperature (20 °C to 25 °C)**.
Do not expose to direct sun light!
7. Briskly shake out the contents of the wells.
Rinse the wells **5 times** with diluted *Wash Solution* (300 µL per well). Strike the wells sharply on absorbent paper to remove residual droplets.
8. Add **100 µL** of *Substrate Solution* into all wells.
9. Incubate for **exactly 15 minutes at room temperature (20 °C to 25 °C) in the dark**.
10. Stop the enzymatic reaction by adding **100 µL** of *Stop Solution* to each well.
Any blue color developed during the incubation turns into yellow.
Note: Highly positive samples can cause dark precipitates of the chromogen!
11. Read the optical density at **450 nm/620 nm** with a microtiter plate reader **within 30 minutes** after adding the *Stop Solution*.

6.3 Measurement

Measure the optical density (OD) of all wells **at 450 nm** and record the OD values for each control and sample in the distribution and identification plan.

Dual wavelength reading using 620 nm as reference wavelength is recommended.

Where applicable **calculate the mean OD values** of all duplicates.

7 RESULTS

7.1 Validation of the Test Run

The test run may be considered valid provided the following criteria are met:

Neg. Control in A1:	OD value lower than 0.200
Standard 1 (Cut-off) in B1 + C1:	OD value between 0.350 – 0.850
Standard 2 in D1:	OD value between 0.750 – 1.450
Standard 3 in E1:	OD value between 0.950 – 2.000
Pos. Control in F1:	OD value between 0.650 – 3.000

7.2 Calculation of quantitative Results

In order to obtain **quantitative results in IU/mL** plot the (mean) OD values of *Neg. Control* and *Standard 1, 2, and 3* on (linear/linear) graph paper in a system of coordinates against their corresponding concentrations (0 – 0.2 – 0.5 – 1.0 IU/mL) and draw a standard calibration curve (OD values on the vertical y-axis, concentrations on the horizontal x-axis). Read results from this standard curve employing the (mean) OD values of each specimen and control.

All suitable computer programs available can be used for automated result reading and calculation. The following mathematical functions can be used: Linear regression or Point to Point calculation of the standard curve.

NOTE: Values of additionally (1:10) diluted samples must be multiplied by the appropriate dilution factor in order to obtain correct results! (Dilution: 1:10 = Dilution factor: 10). (See chapter “5.3 Specimen Dilution”).

8 QUALITY CONTROL

It is recommended to use control samples according to state and federal regulations. The use of control samples is advised to assure the day to day validity of results.

It is also recommended to make use of national or international Quality Assessment programs in order to ensure the accuracy of the results.

If the results of the assay do not fit to the established acceptable ranges of control materials results should be considered invalid.

In this case, please check the following technical areas: Pipetting and timing devices; photometer, expiration dates of reagents, storage and incubation conditions, aspiration and washing methods.

After checking the above mentioned items without finding any error contact your distributor or DRG directly.

9 ASSAY CHARACTERISTICS

9.1 Assay Dynamic Range

The range of the assay is between 0.004 – 1.0 IU/mL.

9.2 Specificity of Antigen (Cross Reactivity)

Due to the reason that all Europeans are vaccinated against Tetanus a cross-reactivity study isn't possible for this parameter. No samples without antibodies against Tetanus Toxin are available to create this study.

10 LIMITATIONS OF USE

Bacterial contamination or repeated freeze-thaw cycles of the specimen may affect the optical density values.

10.1 Interfering Substances

Hemoglobin (up to 4 mg/mL), Bilirubin (up to 0.5 mg/mL) and Triglyceride (up to 30 mg/mL) have no influence on the assay results.

11 LEGAL ASPECTS

11.1 Reliability of Results

The test must be performed exactly as per the manufacturer's instructions for use. Moreover the user must strictly adhere to the rules of GLP (Good Laboratory Practice) or other applicable national standards and/or laws. This is especially relevant for the use of control reagents. It is important to always include, within the test procedure, a sufficient number of controls for validating the accuracy and precision of the test.






The test results are valid only if all controls are within the specified ranges and if all other test parameters are also within the given assay specifications. In case of any doubt or concern please contact DRG.

11.2 Liability

















Any modification of the test kit and/or exchange or mixture of any components of different lots from one test kit to another could negatively affect the intended results and validity of the overall test. Such modification and/or exchanges invalidate any claim for replacement.

Claims submitted due to customer misinterpretation of laboratory results are also invalid. 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 test kit during transportation is not subject to the liability of the manufacturer.

SYMBOLS USED

Symbol	English
RUO	For research use only
	Consult instructions for use
REF	Catalogue number
LOT	Lot. No. / Batch code
	Contains sufficient for <n> tests/
	Storage Temperature
	Expiration Date
	Legal Manufacturer
<i>Distributed by</i>	Distributor
<i>Content</i>	Content
<i>Volume/No.</i>	Volume / No.

SHORT INSTRUCTIONS FOR USE

	All reagents and specimens must be allowed to come to room temperature (20°C - 25°C) before use.
	Dispense 100 µL of Standards and Control into appropriate wells.
	Dispense 100 µL of sample into selected wells.
	Cover wells with foil. Incubate for 60 minutes at 37 °C.
	Briskly shake out the contents of the wells.
	Rinse the wells 5 times with diluted Wash Solution (300 µL per well).
	Strike the wells sharply on absorbent paper to remove residual droplets.
	Dispense 100 µL of Enzyme-Conjugate into each well.
	Incubate for 30 minutes at room temperature.
	Briskly shake out the contents of the wells.
	Rinse the wells 5 times with diluted Wash Solution (300 µL per well).
	Strike the wells sharply on absorbent paper to remove residual droplets.
	Add 100 µL of Substrate Solution to each well.
	Incubate for 15 minutes at room temperature.
	Stop the reaction by adding 100 µL of Stop Solution to each well.
	Determine the absorbance of each well at 450 nm.

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