



## User's Manual

# Rheumatoid Factor IgM ELISA Kit



DEIA271



96T



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

The Rheumatoid Factor (RF) IgM ELISA Test Kit has been designed for the detection and the quantitative determination of RF in serum and plasma. Further applications in other body fluids are possible and can be requested from the Technical Service. This assay is intended for research use only.

### General Description

Rheumatoid arthritis (RA) is a chronic inflammatory disease of unknown etiology. Rheumatoid arthritis is a systemic disease characterized by chronic proliferation and inflammation of joint cartilage and supporting structures. RA is mainly defined by clinical criteria, in which systematic pathogenetic studies have been hampered by doubts about the presence of common pathogenetic mechanisms and the relative lack of unique laboratory findings. IgG rheumatoid factor has been reported to be present in sera of patients with rheumatoid arthritis both with and without IgM rheumatoid factor activity. Rheumatoid factors are IgA, IgG and IgM immunoglobulins with antibody activity directed against antigenic sites on the Fc portion of IgG molecules. Because of its pentavalent structure and ability to cross-link immunoglobulin G antigen, IgM Rheumatoid Factor is the main class identified by clinically available diagnostic assays for Rheumatoid Factor detection. Rheumatoid factors may exist as the mu, gamma, alpha, and epsilon isotypes. Rheumatoid factors are found in 1 to 4 % of the general population. They are present in 75% of adult patients with the highest incidence of rheumatoid factors occurring in persons over 65 years of age and nearly all patients with Felty and Sjogren syndrome. The clinical correlation of an elevated rheumatoid factor should be interpreted cautiously. Increased titers may accompany a variety of acute immune responses, particularly viral infections and a number of other diseases (e.g., infectious mononucleosis, tuberculosis, leprosy, various parasitic diseases, liver disease, sarcoidosis, and lymphoproliferative syndromes). The earliest tests and those still most widely used rely on the agglutinating properties of the IgM class of rheumatoid factors. Sensitized sheep red blood cell (Waalser-Rose) and latex agglutination tests have been developed and routinely employed. These assays are most sensitive for the detection of Rheumatoid factor that is of the IgM isotype because of its multivalent structure. These tests provide a dilution which is difficult to standardize and have laborious processing and poor reproducibility. In contrast to these assays modern ELISA tests are characterized by a higher sensitivity and by the possibility to differentiate between IgA, IgG and IgM Rheumatoid Factors.

### Principles of Testing

The Rheumatoid Factor IgM test kit is based on the principle of the enzyme immunoassay (EIA). Goat IgG is bound on the surface of the microtiter strips. Diluted serum, ready-to-use calibrators and controls are pipetted into the wells of the microtiter plate. A binding between the RF IgM of the serum and the immobilized goat IgG 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-IgM 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 the RF IgM is directly proportional to the intensity of the color.

## Reagents And Materials 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.

**Mikrotiter Strips:** 12 strips with 8 breakable wells each, coated with affinity-purified goat IgG. Ready-to-use.

**Calibrators:** 4 × 2 mL, human serum diluted with PBS, with 0, 50, 100 and 200 IU/mL of IgG Rheumatoid Factor. Addition of 0.02 % methylisothiazolone and 0.02 % bromonitrodioxane. Ready-to-use.

**Positive Control:** 2 mL, human serum diluted with PBS, contains IgG Rheumatoid Factor. The concentration range is given on the vial label. Addition of 0.02% methylisothiazolone and 0.02% bromonitrodioxane. Ready-to-use.

**Negative Control:** 2 mL, human serum diluted with PBS, contains no IgG Rheumatoid Factor. Addition of 0.02% methylisothiazolone and 0.02% bromonitrodioxane. Ready-to-use.

**Enzyme Conjugate:** 15 mL, anti-human-IgG-HRP (rabbit), in protein-containing buffer solution. Ready-to-use.

**Substrate:** 15 mL, TMB (tetramethylbenzidine). Ready-to-use.

**Stop Solution:** 15 mL, 0.5 M sulfuric acid. Ready-to-use.

**Sample Diluent:** 60 mL, PBS/BSA buffer. Addition of 0.095% sodium azide. Ready-to-use.

**Washing Buffer:** 60 mL, PBS + Tween 20, 10× 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.

**Plastic Foils:** 2 pieces to cover the mikrotiter strips during the incubation.

**Plastic Bag:** Resealable, for the dry storage of non-used strips.

## Materials Required But Not Supplied

1. 5 µL-, 100 µL- and 500 µL micro- and multichannel pipets
2. Microtiter Plate Reader (450 nm)
3. Microtiter Plate Washer
4. Reagent tubes for the serum dilution
5. Bidistilled water

## Storage

Store kit at 2-8°C. It is stable up to the expiry date stated on the label of the box. Do not use kit beyond its expiry date.

## Specimen Collection And Preparation

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 calibrators) have to be diluted 1:101 with ready-to-use sample diluent (e.g. 5µL serum+500µL sample diluent).

## Reagent Preparation

**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.

## Assay Procedure

### General Remarks:

1. Strict adherence to the protocol is advised for reliable performance. Any changes or modifications are the responsibility of the user.
2. All reagents and samples must be brought to room temperature before use, but should not be left at this temperature longer than necessary.
3. Standards and samples should be assayed in duplicates.
4. A standard curve should be established with each assay.
5. Return the unused microtiter strips to the plastic bag and store them dry at 2-8°C.

### Procedure:

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) sample and the ready-to-use standards or 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 a 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.

## 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%.

### 1. Qualitative Evaluation

The calculated absorptions for the sera, as mentioned above, are compared with the value for the 50 IU/mL calibrator. If the value of the sample is higher, there is a positive result. For a value below the 50 IU/mL calibrator, there is a negative result. It seems reasonable to define a range of +/-20 % around the value of the 50 IU/mL calibrator 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 patient, taken after 2-4 weeks, is recommended. Both samples should be measured in parallel in the same run.

### 2. Quantitative Evaluation

The ready-to-use calibrators and controls of the RF IgG kit are defined and expressed in arbitrary units (U/mL). This results in an exact and reproducible quantitative evaluation. Consequently for a given patient follow-up controls become possible. The values for controls and calibrators in units are printed on the labels of the vials. For a quantitative evaluation the absorptions of the calibrators and controls are graphically drawn against their concentrations. From the resulting reference curve the concentration values for each patient sample can then be extracted in relation to their absorptions. It is also possible to use automatic computer programs.

## Performance Characteristics

RF ELISA	IgG	IgA	IgM
Intra-Assay-Precision	6.30%	6.20%	4.40%
Inter-Assay-Precision	2.40%	9.10%	7.30%
Inter-Lot-Precision	1.0 – 3.2 %	6.5 – 9.3 %	2.6 – 13.8 %
Analytical Sensitivity	0.67 IU/ mL	0.28 IU/ mL	0.16 IU/ mL
Recovery	95 – 119 %	80 – 113 %	71 – 113 %
Linearity	81 – 128 %	72 – 98 %	85 – 125 %

## Specificity

No cross-reactivity between Rheumatoid factors IgG, IgA and IgM.

## Interferences

No interferences with bilirubin up to 0.3 mg/ mL, hemoglobin up to 8.0 mg/mL and triglycerides up to 5.0 mg/mL

## References

1. Adebajo AO; Wright JK; Cawston TE; Hazleman BL: Rheumatoid factor quantitation: a comparison of ELISA



and nephelometric methods. Med Lab Sci 1991 Jan; 48 (1):47-51.

2. Banchuin N; Janyapoon K; Sarntivijai S; Parivisutt L: Reevaluation of ELISA and latex agglutination test for rheumatoid factor detection in the diagnosis of rheumatoid arthritis. Asian Pac J Allergy Immunol 1992 Jun; 10(1):47- 54.
3. Barka NE; Agopian MS; Peter JB: False-positive IgM antibodies to *Borrelia burgdorferi* in indirect ELISA as a result of IgM rheumatoid factor. J Infect Dis 1990 Jun; 161 (6):1312.