

Human Reverse Triiodothyronine (RT3) ELISA Kit

Catalog No.: abx253119

Size: 96T

Range: 93.75 pg/ml - 6000 pg/ml

Sensitivity: < 56.25 pg/ml

Storage: Store at 4°C for up to 6 months.

Application: For quantitative detection of RT3 in Human Serum, Plasma, Tissue Homogenates and other biological fluids.

Introduction: Reverse triiodothyronine (RT3) is an isomer of triiodothyronine (T3) and is the third-most common iodothyronine that the thyroid gland releases into the bloodstream. The production of hormone by the thyroid gland is controlled by the hypothalamus and pituitary gland. The physiological activity of thyroid hormone is regulated by a system of enzymes that activate, inactivate or simply discard the prohormone T4 and in turn functionally modify T3 and RT3. These enzymes operate under complex direction of systems including neurotransmitters, hormones, markers of metabolism and immunological signals. The levels of RT3 increase in conditions such as euthyroid sick syndrome because its clearance decreases while its production stays the same. The decreased clearance is possibly from lower Thyroxine 5-deiodinase activity in the peripheral tissue or decreased liver uptake of RT3. In addition, increased RT3 concentrations result from upregulated Thyroxine 5-deiodinase activity in critical illness, starvation and fetal life.

Principle of the Assay

This kit is based on a competitive enzyme-linked immuno-sorbent assay technology. RT3 is pre-coated onto a 96-well plate. The standards, samples and a biotin conjugated antibody specific to RT3 are added to the wells and incubated. After washing away the unbound conjugates, Streptavidin-HRP is added to each microplate well and incubated. After TMB substrate solution is added only wells that contain RT3 will produce a blue colour product that changes into yellow after adding stop solution. The intensity of the color yellow is inverse proportional to the RT3 amount bound on the plate. The O.D. absorbance is measured spectrophotometrically at 450 nm in a microplate reader, and then the concentration of RT3 can be calculated.

Kit components

1. One Pre-Coated 96 Well Microplate (12 x 8 well strips)
2. Standard: 2 tubes
3. Sample/Standard Diluent Buffer: 20 ml
4. Biotin conjugated antibody (Dilution 1:100): 60 µl
5. Antibody diluent buffer: 10 ml
6. Streptavidin-HRP Conjugate (Dilution 1:100): 120 µl
7. HRP Diluent Buffer: 10 ml
8. TMB substrate: 10 ml
9. Stop solution: 10 ml
10. Wash buffer (25X): 30 ml

Material Required But Not Provided

1. 37°C incubator
2. Microplate reader (wavelength: 450 nm)
3. High-precision pipette and sterile pipette tips
4. Automated plate washer
5. ELISA shaker
6. 1.5 ml tubes to prepare standard/sample dilutions
7. Deionized or distilled water
8. Absorbent filter papers
9. 100 ml and 1 liter graduated cylinders

Protocol

A. Preparation of sample and reagents

1. Sample

Store samples to be assayed within 24 hours at 2-8°C. Alternatively, aliquot and store at -20°C or -80°C for long term. Avoid repeated freeze-thaw cycles.

- **Serum:** Samples should be collected into a serum separator tube. Coagulate the serum by leaving the tube undisturbed in a vertical position overnight at 4°C or at room temperature for up to 60 minutes. Centrifuge at approximately 1000 × g for 20 min. Analyze the serum immediately or aliquot and store at -20°C or -80°C.
- **Plasma:** Collect plasma using EDTA as an anticoagulant. Centrifuge for 15 minutes at 1000 × g within 30 minutes of collection. Assay immediately or aliquot and store at -20°C. Avoid hemolysis and high cholesterol samples.
- **Tissue homogenates:** The preparation of tissue homogenates will vary depending upon tissue type – this is just an example. Rinse tissues with ice-cold PBS to remove the excess of blood. Weigh before homogenization. Finely mince tissues and homogenize with a tissue homogenizer on ice in PBS and sonicate the cell suspension. Centrifuge the homogenates at 5000 × g for 5 min and collect the supernatant. Assay immediately or aliquot and store at -20°C.
- **Other biological fluids:** Centrifuge at approximately 1000 × g for 20 min to remove precipitant. Analyze immediately or aliquot and store at -20°C or -80°C.

Note:

- » Fresh samples or recently obtained samples are recommended to prevent degradation and denaturalization that may lead to erroneous results. It is recommended to store samples to be used within 5 days at 4°C, within 1 month at -20°C and within 2 months at -80°C.
- » Samples should be clear and transparent. Samples must be diluted so that the expected concentration falls within the kit's range.
- » Please bring sample slowly to room temperature. Sample hemolysis will influence the result. Hemolyzed specimen should not be used. Samples that contain NaN₃ cannot be detected as it interferes with HRP.
- » Always use non-pyrogenic, endotoxin-free tubes for blood collection.

Sample dilution guideline:

Estimate the concentration of the target in the sample and select the correct dilution factor to make the diluted target concentration fall near the middle of the kit's range. Generally, for high concentration (60000 pg/ml - 600000 pg/ml), dilute 1:100, for medium concentration (6000 pg/ml - 60000 pg/ml), dilute 1:10 and for low concentration (93.75 pg/ml - 6000 pg/ml), dilute 1:2. Very low concentrations (≤ 93.75 pg/ml) do not need dilution. Dilute the sample with the provided Sample Diluent Buffer and mix thoroughly. Several trials may be necessary to determine the optimal dilution factor.

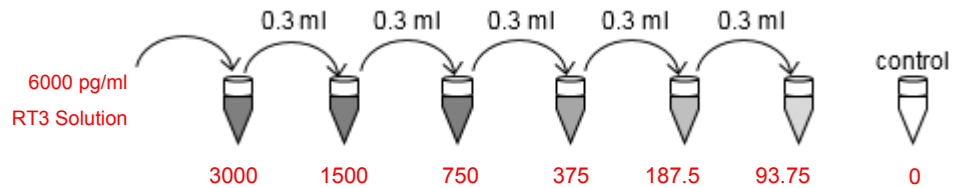
2. Wash buffer

Dilute the concentrated Wash buffer 25-fold (1/25) with distilled water (i.e. add 30 ml of concentrated wash buffer into 720 ml of distilled water).

3. Standard

Preparation of the RT3 standard: standard solution should be prepared no more than 15 min prior to the experiment. Centrifuge at 10,000×g for 1 minute as the powder may drop off from the cap when opening if you do not spin down. (**Note: Do not dilute the standard directly in the plate.**)

- 6000 pg/ml standard solution. Add 1 ml of Sample/Standard diluent buffer into one Standard tube. Allow the reconstituted standard to sit for 15 minutes with gentle agitation prior to carrying out the serial dilutions; avoiding foaming or bubbles.
- 3000 pg/ml → 93.75 pg/ml standard solutions: Label 6 tubes with 3000 pg/ml, 1500 pg/ml, 750 pg/ml, 375 pg/ml, 187.5 pg/ml and 93.75 pg/ml. Aliquot 0.3 ml of the Sample / Standard diluent buffer into each tube. Add 0.3 ml of the above 6000 pg/ml standard solution into 1st tube and mix thoroughly. Transfer 0.3 ml from 1st tube to 2nd tube and mix thoroughly. Transfer 0.3 ml from 2nd tube to 3rd tube and mix thoroughly, and so on.



Note: Do not vortex the standard during reconstitution, as this will destabilize the protein. Once your standard has been reconstituted, it should be used right away. We do not recommend reusing the reconstituted standard. Please use the diluted Standards for a single assay procedure and discard after use.

4. Preparation of Biotin conjugated antibody working solution: prepare no more than 1 hour before the experiment.

- Calculate the total volume of the working solution: $0.05 \text{ ml / well} \times \text{quantity of wells}$. (Allow 0.1-0.2 ml more than the total volume).
- Dilute the Biotin conjugated antibody with Antibody diluent buffer at 1/100 and mix thoroughly. i.e. Add 1 μl of Biotin conjugated antibody into 99 μl of Antibody diluent buffer.

5. Preparation of Streptavidin-HRP working solution: prepare no more than 30 min before the experiment.

- Calculate the total volume of the working solution: $0.1 \text{ ml / well} \times \text{quantity of wells}$. (Allow 0.1-0.2 ml more than the total volume).
- Dilute the Streptavidin-HRP Conjugate with HRP diluent buffer at 1/100 and mix thoroughly. i.e. Add 1 μl of Streptavidin-HRP Conjugate into 99 μl of HRP diluent buffer.

B. Assay Procedure

Equilibrate the Streptavidin-HRP working solution to room temperature and TMB substrate at 37°C for 30 minutes prior to use. It is recommended to plot a standard curve for each test.

- Wash the plate two times before adding standard, samples and buffers.** Any strips that are not being used should be kept dry and stored at 4°C. Set standard, test sample and control (zero) wells on the pre-coated plate and record their positions. It is recommended to measure each standard and sample in duplicate.
- Add 50 μl of the prepared standards solutions into the standard wells.
- Add 50 μl of Sample / Standard diluent buffer into the control (zero) well.
- Add 50 μl of appropriately diluted sample into test sample wells.
- Immediately add 50 μl of Biotin conjugated antibody working solution into each well. (Please add the solution at the bottom of each well without touching the side wall).
- Cover the plate with the plate sealer. Gently tap the plate to mix thoroughly. Incubate at 37°C for 45 minutes.
- Remove the cover and wash the plate 3 times. Discard the solution without touching the side walls. Blot the plate on an absorbent material. Fill each well completely (approximately 400 μl) with Wash buffer and incubate on an ELISA shaker for 2 min. Invert the plate each time and decant the contents; tap it 4-5 times on absorbent paper towel to completely remove the liquid. Repeat this procedure for a total of three times.

Please note: For automated washing, discard the solution and wash the plate three times overfilling the wells with Wash buffer. After the final wash invert the plate, decant the contents; tap it 4-5 times on absorbent paper towel to completely remove the liquid. It is recommended that the washer be set for a soaking time of 1-2 min.

- Add 100 μl of Streptavidin-HRP working solution into each well, cover the plate with a new sealer and incubate at 37°C for 30 minutes.

9. Remove the cover and wash the plate 5 times with Wash buffer. Allow the wash buffer to remain in the wells 1-2 min for each wash. Discard the washing buffer and blot the plate onto absorbent filter papers or other absorbent material.
10. Add 90 µl of TMB substrate into each well. Cover the plate and incubate at 37°C in dark conditions for 15-20 minutes (incubation time is for reference only, do not exceed 30 minutes). When an apparent gradient appears in the standard wells the reaction can be terminated.
11. Add 50 µl of Stop solution into each well (including the blank well). There should be a color change to yellow. Gently tap the plate to ensure thorough mixing.
12. Ensure that there are no fingerprints or water on the bottom of the plate, and that the fluid in the wells is free of bubbles. Measure the absorbance at 450 nm immediately.

This assay is competitive, therefore there is an inverse correlation between RT3 concentration in the sample and the absorbance measured. Create a graph with the log of the standard concentration (y-axis) and absorbance measured (x-axis). Apply a best fit trendline through the standard points. Use this graph calculate sample concentrations based on their OD values. If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.

Note: If the samples measured were diluted, multiply the dilution factor by the concentrations from interpolation to obtain the concentration before dilution.

C. Precautions

1. Before using the kit, centrifuge the tubes briefly to bring down the contents trapped in the lid. For each step in the procedure, total dispensing time for addition of reagents to the assay plate should not exceed 10 minutes.
2. Avoid foaming or bubbles when mixing or reconstituting components. Prepare the Standard solutions within 15 min of starting the experiment. Please use the diluted Standard for a single assay procedure and discard after use.
3. It is recommended to assay all standards, controls and sample in duplicate. Do NOT let the plate dry out completely as this will inactivate the biological material on the plate.
4. Ensure plates are properly sealed or covered during incubation steps.
5. Complete removal of all solutions and buffers during wash steps is necessary for accurate measurement readings.
6. To avoid cross contamination do not reuse pipette tips and tubes.
7. Wash buffer may crystallize and separate. If this happens, please warm the tube and mix gently to dissolve.
8. The TMB Substrate solution is easily contaminated; work under sterile conditions when handling the TMB substrate solution. The TMB Substrate solution should also be protected from light. Unreacted substrate should be colorless or very light yellow in appearance. Aspirate the dosage needed with sterilized tips and do not dump the residual solution back into the vial.

D. Precision

Intra-assay Precision (Precision within an assay): 3 samples with low, medium and high levels of RT3 were tested 20 times on one plate, respectively.

Inter-assay Precision (Precision between assays): 3 samples with low, medium and high levels of RT3 were tested on 3 different plates, 8 replicates in each plate.

$$CV (\%) = (\text{Standard Deviation} / \text{mean}) \times 100$$

Intra-Assay: CV<8%

Inter-Assay: CV<10%

