

# FT3 iClia

## Chemiluminescence microparticle immunoassay for quantitative detection of free triiodothyronine (FT3) in human serum/plasma

### 1. INTRODUCTION

Free triiodothyronine (FT3) is the free state of triiodothyronine (T3) and accounts for approximately 0.03% of T3. T3 is currently the most bioactive thyroid hormone known and is an important regulator of body metabolism, growth and development.

Clinically, FT3 is mainly used for auxiliary evaluation of thyroid function. It is generally believed that FT3 is a sensitive indicator for the diagnosis of hyperthyroidism. As the truly active part of the physiological effect of thyroid hormone, FT3 can play a physiological effect by binding to specific receptors on target cells through cell membrane entry cells and can accurately reflect the functional status of thyroid gland and its impact on human function.<sup>[2]</sup> Clinical studies have shown that the serum FT3 concentration is significantly increased in patients with general hyperthyroidism, due to changes in TBG concentration in the serum during treatment such as pregnancy and residual drugs, the total T3 detection cannot correctly reflect the thyroid status, while the serum FT3 concentration will not change due to changes in TBG concentration.<sup>[3]</sup> Therefore, the determination of serum FT3 is one of the most important indicators for judging hyperthyroidism. In most cases of hyperthyroidism, the increase of serum FT3 is paralleled by the increase of serum FT4. However, in T3 toxicosis, serum FT4 concentrations are in the normal range, and only FT3 is increased, therefore, it is clinically more meaningful for the diagnosis of hyperthyroidism to determine serum FT3 than to determine serum FT4. In addition, for patients with hyperthyroidism treated with radioiodine or drugs, the determination of serum FT3 can be used as a reliable indicator to determine the efficacy.

### 2. INTENDED USE

FT3 iClia is a chemiluminescent microparticle immunoassay for the quantitative detection of free triiodothyronine (FT3) in human serum/plasma. Clinically, it is mainly used to evaluate thyroid function. The assay kit is intended for in vitro diagnostic use.

### 3. PRINCIPLE
















FT3 iClia is a "competitive" immunoassay using microparticle, acridinium ester-labeled Chemiluminescent technology.

In the first step, anti-FT3 antibody labeled magnetic microparticle and human serum/plasma are mixed and incubated in an assay tube. Next, FT3 conjugated acridinium ester is added and combined, AE labelled FT3 and FT3 in sample compete for the binding site of FT3 antibody on the binding magnetic microparticle, and the microparticle FT3 antibody/FT3 immune complex is kept with the help of a magnetic separator. Unbound acridinium ester and other substance are removed by washing and finally the bound enzyme is detected by addition of Pre-Trigger Solution and Trigger Solution. The relative light unit (RLU) intensity is inversely proportional to the amount of FT3 antigen. According to the FT3 RLU-concentration standard curve, the RLU tested can be interpreted to FT3 concentration in the sample expressed as pmol/L.

For quantitative testing of free triiodothyronine (FT3), the FT3 iClia assay utilizes a predefined lot-specific Master Curve which is uploaded into the instrument through the reagent Master Calibration Curve barcode. Based on the Master Curve and results obtained by running two Calibrators, an instrument specific Working Curve is created, which is used to calculate pmol/L from the RLU obtained for each sample.

### 4. DESCRIPTION OF SYMBOLS USED

The following are graphical symbols used in or found on J. Mitra diagnostic products and packing. These symbols are the most common ones appearing on medical devices and their packing. They are explained in more detail in the European Standard EN ISO 15223-1:2021.

	Manufactured By		In vitro diagnostic medical device
	No. of tests Lot Number Batch Number		See Instruction for use Temperature Limitation
	LOT		Caution - See instruction for use
	Manufacturing Date		Catalogue Number
	Expiry Date		Keep away from sunlight
	Do not use if package is damaged		Contains biological Material of Animal Origin
	Contains biological Material of Human Origin		Keep Dry
	Country of Manufacture		

### 5. KIT PRESENTATION

- 50 Test Pack
- 100 Test Pack

### 6. KIT & ITS COMPONENTS

COMPONENT	DESCRIPTION
<b>Microparticles Buffer</b>	Magnetic microparticles buffer coated with anti-FT3 antibodies with preservatives.
<b>Assay Buffer</b>	Buffer containing protein stabilizer and preservatives.
<b>AE Conjugate</b>	Containing FT3 linked to acridinium ester with preservatives.
<b>Control-1 (Q1)</b>	Low concentration of FT3 in Human Serum containing
<b>Control-2 (Q2)</b>	High concentration of FT3 in Human Serum containing preservatives.
<b>Calibrator-1 (C0)</b>	Low concentration of FT3 in Human Serum containing preservatives.
<b>Calibrator-2 (C1)</b>	High concentration of FT3 in Human Serum containing preservatives.
<b>Reagent Sealers</b>	Adhesive sheets to cover the opened reagents.

### 7. STORAGE AND STABILITY

The shelf-life of the kit is 12 months from the date of manufacturing, when stored at 2-8°C. **Once the kit is opened, onboard stability of reagents, calibrator and control is 30 days at 2-8°C.**

### 8. ADDITIONAL MATERIAL AND INSTRUMENTS REQUIRED

- **Pre-Trigger Solution:** Hydrogen peroxide solution.
- **Trigger Solution:** Sodium hydroxide solution.
- **Wash Buffer:** Phosphate buffered saline solution with surfactant.
- **Assay Cup**
- **Sample Diluent (optional)**
- **CLIA 181 Analyzer**

All materials and analyzer to be used for running the FT3 iClia shall be from J. Mitra & Co. Pvt. Ltd.

### 9. SPECIMEN COLLECTION & HANDLING

1. Only human serum or plasma samples should be used for the test.
2. For serum collection use serum vacutainer. While preparing serum samples, remove the serum from the clot as soon as possible to avoid hemolysis. Fresh serum/plasma samples are preferred.
3. For plasma collection: use Dipotassium EDTA, Tripotassium EDTA, Sodium heparin and lithium heparin gel vacutainer.
4. Specimens should be free of microbial contamination and may be stored at 2-8°C for one week, or frozen at -20°C or lower. Avoid repeated freezing and thawing.
5. Do not use heat inactivated samples as their use may give false results. Hemolyzed and Icteric hyperlipemic samples may give erroneous results.
6. Serum specimens from patients receiving anticoagulant or thrombolytic therapy may contain fibrin due to incomplete clot formation.
7. Always use clear specimens. Centrifuge viscous/ thick or turbid specimen at 10,000 RPM for 15 minutes prior to use to avoid inconsistent result.
8. Use of disposable pipettes or pipette tips is recommended to prevent cross contamination.

### 10. SPECIMEN PROCESSING

#### (A) FROZEN SAMPLE

FT3 iClia test is best used with fresh samples that have not been frozen and thawed. However most frozen samples will perform well if the procedure suggested below is followed.

Allow the frozen sample to thaw in a vertical position in the rack. Do not shake the sample. This allows particles to settle to the bottom. Centrifuge the sample at 10,000 rpm for 15 minutes.

## (B) TRANSPORTATION

If the specimen is to be transported, it should be packed in compliance with the current Government regulations regarding transport of aetiologic agents.

## 11. WARNING & PRECAUTION

**CAUTION:** THIS KIT CONTAINS MATERIALS OF HUMAN ORIGIN. NO TEST METHOD CAN OFFER COMPLETE ASSURANCE THAT HUMAN BLOOD PRODUCTS WILL NOT TRANSMIT INFECTION. NEGATIVE CONTROL, POSITIVE CONTROL & ALL THE SAMPLES TO BE TESTED SHOULD BE HANDLED AS THOUGH CAPABLE OF TRANSMITTING INFECTION.

1. The use of disposable gloves and proper biohazardous clothing is STRONGLY RECOMMENDED while running the test.
2. In case there is a cut or wound in hand, DO NOT PERFORM THE TEST.
3. Do not smoke, drink or eat in areas where specimens or kit reagents are being handled.
4. Tests are for *in vitro* diagnostic use only and should be run by competent person only.
5. Do not pipette by mouth.
6. All materials used in the assay and samples should be decontaminated in 5% sodium hypochlorite solution for 30-60 min. before disposal or by autoclaving at 121°C at 15psi for 60 minutes. Do not autoclave materials or solution containing sodium hypochlorite. They should be disposed off in accordance with established safety procedures.
7. Wash hands thoroughly with soap or any suitable detergent, after the use of the kit. Consult a physician immediately in case of accident or contact with eyes, in the event that contaminated material are ingested or come in contact with skin puncture or wounds.
8. Spills should be decontaminated promptly with Sodium Hypochlorite or any other suitable disinfectant.

## 12. PRECAUTIONS FOR USE & REAGENT HANDLING

1. Do not use kit components beyond the expiration date which is printed on the kit.
2. Store the reagents & samples at 2-8°C.
3. Do not pool reagents from within a batch or between different batches, as they are optimised for individual batch to give best results.
4. Before loading the reagent kit in the clia analyzer for the first time, ensure proper mixing of microparticle bottle to resuspend microparticles that may have settled during transport or storage.
5. Once reagents are opened, reagent Sealer must be used to prevent reagent evaporation and contamination and to ensure reagent integrity. Reliability of assay results cannot be guaranteed if reagent sealers are not used according to the instructions given.
6. Mark the test specimen with patient's name or identification number. Improper identification may lead to wrong result reporting.
7. To avoid contamination, wear clean gloves when placing a reagent sealer on an uncapped reagent bottle.
8. Once a reagent sealer has been placed on an open reagent bottle, do not invert the bottle as this will result in reagent leakage and may compromise assay results.
9. Reagents may be stored on or off the Chemiluminescence immunoassay analyzer. If reagents are removed from the analyzer, store them at 2-8°C (with Reagent Sealers) in an upright position. For reagents stored off the system, it is recommended that they should be stored in their original trays and boxes to ensure they remain upright. If the microparticle bottle does not remain upright (with a Reagent Sealer placed) while in refrigerated storage off the system, the reagent kit must be discarded.
10. Run FT3 Control-1 & FT3 Control-2 in each assay to evaluate validity of the kit.
11. Distilled or deionised water must be used for wash buffer preparation.
12. Avoid strong light exposure during the assay.
13. In case of any doubt the run should be repeated.

## 13. TEST PROCEDURE

### Assay Procedure

1. Refer to the Clia-181 user manual for detailed information on preparing the analyzer.
2. Before loading the FT3 iClia reagent tray on the analyzer for the first time, mix contents of the microparticle buffer bottle to resuspend microparticles that may have settled during transportation/ storage. Once the microparticles have been loaded, no further mixing is required.

**Note:** Swirl the microparticle buffer 1 bottle. Visually inspect the bottle to ensure microparticle are resuspended. If microparticle are still adhered to the

**bottle, mix the contents of the microparticle buffer bottles till they are completely resuspended. If the microparticle do not resuspend, DO NOT USE. Once the microparticle have been resuspended, place a reagent sealer on the bottle.**

3. Load the FT3 iClia reagent tray on the Chemiluminescence immunoassay analyzer.
4. Verify that all necessary reagents are available in the reagent tray.
5. Ensure that adequate sample volume (not less than 250 µL) is present in sample tube prior to running the test.
6. Sample volume required for each additional test from same sample tube is 25µL.
7. The FT3 test-specific parameters are stored in reagent barcode placed on the reagent tray and read through barcode reader. In cases, the barcode cannot be read, contact customer support at: 011-47130300, 500 or write us at: jmitra@jmitra.co.in.
8. Run calibration, if required.
9. Mix FT3 iClia calibrators and controls by gentle inversion before use. Open the the cap and place the FT3 Calibrator-1 & FT3 Calibrator-2 and FT3 Control-1 & FT3 Control-2 vials into each respective sample positions. Read the barcode for calibrator and controls provided with the kit.
10. Press START. The test result for first sample will be obtained at 30 minutes.
11. The Chemiluminescence immunoassay analyzer performs all the functions automatically and calculate the results.

### Calibration

1. Traceability: This assay has been standardized against the Roche FT3 reagent kit.
2. Every FT3 iClia kit has a two-dimension code label containing the predefined master curve of the particular reagent lot.
3. Test all both Calibrators in duplicate. Both FT3 Control-1 and FT3 Control-2 must be tested in each run to evaluate the assay calibration. Ensure that controls values are within the validity range specified in the FT3 iClia QC data sheet.
4. Once calibration is accepted (within range) and stored, all subsequent samples may be tested without further calibration unless:
  - a) After each exchange/use of new lot (Test reagent and pritrigger/ Trigger solution/ wash buffer).
  - b) Every 15 days and/or at the time of any component to be changed.
  - c) Controls are out of validation range.
  - d) Required by pertinent regulations.
  - e) After specified service procedures have been performed or maintenance to critical part or subsystems that might influence the performance of the FT3 iClia.

### RESULT CALCULATION:

The analyzer automatically calculates the concentration of each sample. The results are given in pmol/L.

### RESULT INTERPRETATION

If sample concentration is lower than the lower limit of the linear range, report the result < 2.00 pmol/L, while > 50.00 pmol/L when it is higher than the upper limit of linear range.

### DETERMINATION OF REFERENCE RANGE

Each laboratory should establish its own range of normal value. The values given below are only indicative.

Reference Interval of this assay is considered as 2.84 - 6.8 pmol/L for healthy people, which is established referring to literatures, based on the rest results of more than 60 clinical samples.

Due to the differences in geography, race, gender or age, it is suggested each laboratory establish its own reference interval or conduct verification of the existing reference interval.

## 14. PERFORMANCE CHARACTERISTICS

- Assay results obtained in individual laboratories may vary from data presented in this product insert.

### Limit of Blank (LoB)

- The Limit of Blank was determined in accordance with the CLSI (Clinical and Laboratory Standards Institute) EP17-A requirements.
- The Limit of Blank is the 95th percentile value from n >20 measurements of analyte free samples over several independent series. The Limit of Blank corresponds to the concentration below which analyte-free samples are found with a probability of 95%.
- The observed LoB value was < 1.50 pmol/L.

**Accuracy:** The accuracy of FT3 iClia was detected with 60 clinical specimens and compared with Roche CLIA. The co-relation co-efficient is >0.990.

**Precision**

**Intra Assay Variation**

Within run variation was determined by 10 replicate measurements of two different FT3 control sera( Low ) and (High) in one assay in 3 different lots. The within assay variability is <10%.

**Inter Assay Variation**

Between run variation was determined by 10 replicate measurements in 10 sequential days of two different control sera( Low ) and (High)in 3 different lots.The between assay variability is <10%.

Intra-Assay, n=10			Inter-Assay, n=10×2		
Control	Mean (pmol/L)	CV	Sample	Mean (pmol/L)	CV
1	5.03	5.19%	1	5.07	8.27%
2	19.65	4.74%	2	19.82	8.40%

**Inter machine(CLIA-181 Analyzer) Variation**

Between machine variation was determined by 3 replicate measurements of two different FT3 control sera( Low ) and (High)in 3 different lots in 3 different CLIA-181 Analyzer. The between machine variability is <10.0 %.

**Linearity**

The linearity was determined in accordance with the CLSI (Clinical and Laboratory Standards Institute) EP6-A requirements.

The linearity range was verified by more than 6 concentration levels which encompass or be equal to the minimum and the maximum values of linearity range and duplicate assays in triplicate in single run for each lot at all 6 levels.

The FT3 iCia kit has been demonstrated to be linear from is 2.00 pmol/L to 50.00pmol/L., regression (R<sup>2</sup>) of more than >0.990.

**Analytical specificity**

**Cross-Reactivity**

A study was performed based on guidance from CLSI EP7-A2.

The cross-reactants listed below (Using FT3-free samples) were evaluated to determine whether FT3 concentrations were affected when using the FT3 iCia (Free Tri-iodothyronine Hormone assay) kit.

Cross-Reactant	Cross-Reactant Concentration	Results
Thyroid hormone	200 ng/mL	< 1.5 pmol/L
3,3',5'-Triiodothyronine	100 ng/mL	< 1.5 pmol/L
3,3'-Diiodothyronine	200 ng/mL	< 1.5 pmol/L

**Interference**

Potentially interfering substances were evaluated to determine whether FT3 concentrations were affected when using the FT3 iCia (Free Tri-iodothyronine Hormone assay) kit. Samples containing the potential interferents were prepared at two FT3 concentrations. The samples were assayed, and the FT3 concentrations of the spiked samples were compared to the reference samples.

Potential Interferent	Interferent Concentration	% Interferent Bias
Bilirubin	20 mg/dL	<10%
Hb	500 mg/dL	<10%
Intralipid	1000 mg/dL	<10%
Total protein	10 g/dL	<10%
RF	1000IU/mL	< 10%
ANA	400AU/mL	< 10%
HAMA	600ng/mL	< 10%

**15. LIMITATION OF THE TEST**

- The FT3 iCia should be used for detection of FT3 in serum or plasma only and not in other body fluids.
- Results should be used in conjunction with other data; e.g., symptoms, results of other tests, and clinical impressions.
- If the FT3 results are inconsistent with clinical evidence, additional testing is recommended.
- Specimens from patients who have received preparations of mouse monoclonal antibodies for diagnosis or therapy may contain human anti-mouse antibodies (HAMA). Such specimens may show either falsely elevated or depressed values when tested

with assay kits that employ mouse monoclonal antibodies. Additional information may be required for diagnosis.

- Heterophilic antibodies in human serum can react with reagent immunoglobulins, interfering with in vitro immunoassays. Patients routinely exposed to animals or to animal serum products can be prone to this interference, and anomalous values may be observed. Additional information may be required for diagnosis.

**16. LIMITED EXPRESSED WARRANTY DISCLAIMER**

The manufacturer limits the warranty to the test kit, as much as that the test kit will function as an *in vitro* diagnostic assay within the limitations and specifications as described in the product instruction-manual, when used strictly in accordance with the instructions contained therein. The manufacturer disclaims any warranty expressed or implied including such expressed or implied warranty with respect to merchantability, fitness for use or implied utility for any purpose. The manufacture’s liability is limited to either replacement of the product or refund of the purchase price of the product and in no case liable to for claim of any kind for an amount greater than the purchase price of the goods in respect of which damages are likely to be claimed.

The manufacturer shall not be liable to the purchaser or third parties for any injury, damage or economic loss, howsoever caused by the product in the use or in the application there of.

**17. REFERENCES**

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**18. TROUBLE SHOOTING CHART**

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. Controls out of validation limit	a) Controls/ calibrator deterioration due to improper storage or used after expiry.	Use controls/ calibrator within 30 days once opened and Check storage temp. It should be 2-8°C.
	b) Cross contamination of Controls	Pipette carefully and do not interchange caps.
	c) Reagents deterioration due to improper storage or used after expiry.	Use reagents within 30 days once opened and Check storage temp. It should be 2-8°C.
2) High FT3 test results	a) Use of turbid, lipaemic or hemolyzed sample.	Use clear fresh sample. Refer specimen collection, handling and processing for more details.
	b) Sample position is wrongly defined while loading the sample details in analyzer.	check the sample position and run the test meticulously.
3) Low FT3 results	a) Sample deterioration due to improper Storage or microbially contaminated sample.	Use clear fresh sample immediately after collection. Refer Specimen collection, and handling processing for more details.
	b) Sample position is wrongly defined while loading the sample details in analyzer.	check the sample position and run the test meticulously.
	c) Magnetic microsphere are not properly mixed before loading in the analyzer.	Ensure proper mixing of bottle containing microparticles by gentle shaking/ inversion before use.

*in vitro* diagnostic Reagent, not for medicinal use

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