Hormone

ichroma™ T3

INTENDED USE

ichroma™ T3 is a fluorescence Immunoassay (FIA) for the quantitative determination of triiodothyronine (total T3) in human serum/plasma. It is useful as an aid in management and monitoring of determination of thyroid disorders.

For *in vitro* diagnostic use only.

INTRODUCTION

3,5,3' Triiodothyronine (T3) is a thyroid hormone with a molecular weight of 651 daltons.[1]

T3 circulates in the blood as an equilibrium mixture of free and protein bound hormone.[2] T3 is bound to thyroxin binding globulin (TBG), prealbumin, and albumin. The actual distribution of T3 among these binding proteins is controversial as estimates range from 38-80% for TBG, 9-27% for prealbumin, and 11-35% for albumin.[3]

T3 plays an important role in the maintenance of the euthyroid state. T3 measurements can be a valuable component in diagnosing certain disorders of thyroid function.[4] Most reports indicate that T3 levels distinguish clearly between euthyroid and hyperthyroid subjects, but provide a less clear-cut separation between hypothyroid and euthyroid subjects.[5] Total T3 measurements may be valuable when hyperthyroidism is suspected and the free T4 is normal.[6] For example, one recognized type of thyroid dysfunction is T3 thyrotoxicosis, associated with a decrease in serum thyroid stimulating hormone (TSH), increased T3 level, normal T4, normal free T4, and normal to increase in vitro Uptake results.[7-11]

T3 levels are affected by conditions which affect TBG concentration.[12-14] Slightly elevated T3 levels may occur in pregnancy or during estrogen therapy, while depressed levels may occur during severe illness, renal failure, myocardial infarction, alcoholism, inadequate nutritional intake, and during therapy with some medications such as dopamine, glucocorticoids, methimazone, propranolol, propylthiouracil, and salicylates.[6,15,16]

Numerous conditions unrelated to thyoid disease may cause abnormal T3 values.[5, 17-20] Consequently, total T3 values should not be used on their own in establishing the thyroid status of an individual. The level of serum T4, TSH and other clinical findings must be considered as well.

PRINCIPLE

The test uses a competitive immunodetection method.

In this method, the target material in the sample binds to the fluorescence (FL)-labeled detection antibody in detection buffer, to form the complex as sample mixture. This complex is loaded to migrate onto the nitrocellulose matrix, where the covalent couple of T3 and bovine serum albumin (BSA) is immobilized on a test strip, and interferes with the binding of target material and FL-labeled antibody. If the more target material exists in blood, the less detection antibody is accumulated, resulting in the less fluorescence signal.

COMPONENTS

ichroma™ T3 consists of 'Test cartridges', 'Solution A Tubes', 'Solution B Vial 'and an 'ID chip'.

- The test cartridge contains a test strip, the membrane which has T3-BSA at the test line, while chicken IgY at the control line.
- Each test cartridge is individually sealed in an aluminum foil pouch containing a desiccant. 25 sealed test cartridges are packed in a box which also contains an ID chip.
- The solution A pre-dispensed in a tube contains ANS and sodium azide in NaOH solution.
- The solution B is dispensed in a vial contains anti human T3-fluorescence conjugate, anti chicken IgY-fluorescence conjugate, bovine serum albumin (BSA) as a stabilizer and less than 0.1% sodium azide as a preservative in phosphate buffer.
- The solution A, B are packaged together in a single box. The box will be placed in a Styrofoam box with ice pack for shipping.

WARNINGS AND PRECAUTIONS

- For *in vitro* diagnostic use only.
- Carefully follow the instructions and procedures described in this 'Instruction for use'.
- Use only fresh samples and avoid direct sunlight.
- Lot numbers of all the test components (test cartridge, ID chip and solution A & B) must match each other.
- Do not interchange the test components between different lots or use the test components after the expiration date, either of which might yield misleading of test result(s).
- Do not reuse. A solution A tube should be used for processing one sample only. So should a test cartridge.
- The test cartridge should remain sealed in its original pouch before use. Do not use the test cartridge, if is damaged or already opened.
- Frozen sample should be thawed only once. For shipping, samples must be packed in accordance with the regulations. Sample with severe hemolytic and hyperlipidemia cannot be used and should be recollected.
- Just before use, allow the test cartridge, solution A, solution B and sample to be at room temperature for approximately 30 minutes.
- **ichroma™ T3** as well as the instrument for ichroma™ tests should be used away from vibration and/or magnetic field. During normal usage, it can be noted that instrument for ichroma™ tests may produce minor vibration.
- Used solution A, B, pipette tips and test cartridges should be handled carefully and discarded by an appropriate method in accordance with relevant local regulations.
- An exposure to larger quantities of sodium azide may cause certain health issues like convulsions, low blood pressure and heart rate, loss of consciousness, lung injury and respiratory failure.
- **ichroma™ T3** will provide accurate and reliable results subject to the following conditions.
  - Use **ichroma™ T3** should be used only in conjunction with instrument for ichroma™ tests.
  - Any anticoagulants other than **heparin sodium** should be avoided.

STORAGE AND STABILITY

- The test cartridge is stable for 20 months (while sealed in an aluminum foil pouch) if stored at 4 - 30°C.
- The solution A pre-dispensed in a tube is stable for 20 months if stored at 2 - 8°C.
- The solution B dispensed in a vial is stable for 20 months if stored at 2 - 8°C.
- Opened Solution B is stable for 12 months at 2-8°C if kept in the capped original container and free from contaminations.
- After the test cartridge pouch is opened, the test should be performed immediately.

LIMITATION OF THE TEST SYSTEM

- The test may yield false positive result(s) due to the cross-reactions and/or non-specific adhesion of certain sample components to the capture/detector antibodies.
- The test may yield false negative result. The non-responsiveness of the antigen to the antibodies is most common where the epitope is masked by some unknown components, so as not to be detected or captured by the antibodies. The instability or degradation of the antigen with time and/or temperature may cause the false negative as it makes antigen unrecognizable by the antibodies.
- Other factors may interfere with the test and cause erroneous results, such as technical/procedural errors, degradation of the test components/reagents or presence of interfering substances in the test samples.
- Any clinical diagnosis based on the test result must be supported by a comprehensive judgment of the concerned physician including clinical symptoms and other relevant test results.

MATERIALS SUPPLIED

REF CFPC-44

Components of **ichroma™ T3**

- Cartridge Box:
  - Cartridges 25
  - ID Chip 1
  - Instruction For Use 1
- Box containing Solution A, B
  - Solution A tubes 25
  - Solution B Vial (3 mL) 1

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **ichroma™ T3**. Please contact our sales division for more information.

- Instrument for ichroma™ tests
  - **ichroma™ Reader** REF FR203
  - **ichroma™ D** REF 13303
- **ichroma™ Printer** REF FPRR007
- **ichroma™ Universal Control** I REF CFPO-25

SAMPLE COLLECTION AND PROCESSING

The sample type for **ichroma™ T3** is human serum / plasma.

- It is recommended to test the sample within 24 hours after collection.
- The serum or plasma should be separated from the clot by centrifugation within 3 hours after the collection of whole blood.
- Samples may be stored for up to a week at 2-8°C prior to being tested. If testing will be delayed more than a week, samples should be frozen at -20°C.
- Samples stored frozen at -20°C for 2 months showed no performance difference.
- Once the sample was frozen, it should be used one time only for test, because repeated freezing and thawing can result in the change of test values.

TEST SETUP

- Check the contents of **ichroma™ T3**: Sealed Test Cartridge, Solution A Tubes, Solution B Vial and ID Chip.
- Ensure that the lot number of the test cartridge matches that of the ID chip as well as the solution A & B.
- Keep the sealed test cartridge (if stored in refrigerator), solution A and solution B at room temperature for at least 30 minutes just prior to the test. Place the test cartridge on a clean, dust-free and flat surface.
- Turn on the instrument for ichroma™ tests.
- Insert the ID Chip into the ID chip port of the instrument for ichroma™ tests.
- Press the 'Select' button on the instrument for ichroma™ tests. (Please refer to the 'Instrument for ichroma™ tests Operation Manual' for complete information and operating instructions.)

TEST PROCEDURE

1) Transfer 75 µL (Human serum / plasma / control) of sample using a transfer pipette to a tube containing the solution A (yellow tube).
2) Close the lid of the solution A tube and mix the sample thoroughly by shaking it about 10 times. (The sample mixture must be used immediately.)
3) Add 75ul of Solution B using a transfer pipette with new tip to the tube containing the solution A and sample mixture.
4) Close the lid of the solution A tube and mix the sample thoroughly by shaking it about 10 times.
5) Incubate the solution A + Solution B + sample mixture at room temperature for 8 minutes.
6) Pipette out 75 µL of a sample mixture and load it into the sample well on the test cartridge.
7) Leave the sample-loaded test cartridge at room temperature for 8 minutes.
8) To scan the sample-loaded cartridge, insert it into the cartridge holder of the instrument for ichroma™ tests. Ensure proper orientation of the cartridge before pushing it all the way inside the cartridge holder. An arrow has been marked on the cartridge especially for this purpose.
9) Press 'Select' button on the instrument for ichroma™ tests to start the scanning process.
10) Instrument for ichroma™ tests will start scanning the sample-loaded cartridge immediately.
11) Read the test result on the display screen of the instrument for ichroma™ tests.

INTERPRETATION OF TEST RESULT

- Instrument for ichroma™ tests calculates the test result automatically and displays T3 concentration of the test sample in terms of ng/mL and nmol/L.
- The cut-off (reference range)

Age group of the subject			ng/ml	nmol/L (SI unit)
Adult			**0.8 – 2.0**	**1.23 – 3.08**
Pediatric Ranges	1 - 10 years		0.82 – 2.82	1.26 – 4.34
	11 - 15 years	Male	0.8 – 2.33	1.23 – 3.59
		Female	0.6 – 2.09	0.92 – 3.22
	16 - 17 years	Male	0.71 – 2.12	1.09 – 3.27
		Female	0.61 – 1.51	0.94 – 2.33

- Working range : 0.5~5.0 ng/mL (0.77~7.7 nmol/L)
- Conversion factor as unit of nmol/L
  - nmol/L (SI unit) = 1.54 × ng/mL
  - ng/dl = 100 × ng/mL

QUALITY CONTROL

- Quality control tests are a part of the good testing practice to confirm the expected results and validity of the assay and should be performed at regular intervals.
- The control tests should be performed immediately after opening a new test lot to ensure the test performance is not altered.
- Quality control tests should also be performed whenever there is any question concerning the validity of the test results.
- Control materials are not provided with **ichroma™ T3**. For more information regarding obtaining the control materials, contact Boditech Med Inc.'s Sales Division for assistance. (Please refer to the instruction for use of control material.)

PERFORMANCE CHARACTERISTICS

- **Cross reactivity**: There, in test samples, are biomolecules such as below the table were added to the test sample(s) at concentrations much higher than their normal physiological levels in blood. **ichroma™ T3** test results did not show any significant cross-reactivity with these biomolecules.

Cross reactants	Concentration	Cross reactivity (%)
D-thyroxine	300ng/ml	0.19
L-thyroxine	300ng/ml	0.19
Reverse T3	500ng/ml	0.08
Salicylic acid	1,000,000ng/ml	ND
Monoiodotyrosine	50,000ng/ml	ND

* ND : Not Detected

- **Interference:** Study of interference from table below with **ichroma™ T3** showed following results. EDTA (K_2) and sodium citrate as an anticoagulants, have effects on **ichroma™ T3** test in the procedure.

Interference materials	Concentration	Interference (%)
D-glucose	60mM/L	< 0.7
L-Ascorbic acid	0.2mM/L	< 0.8
Bilirubin	0.4mM/L	< 0.1
Hemoglobin	2g/L	< 0.1
Cholesterol	13mM/L	< 5.5
triglyceride	10mg/ml	< 2.3
EDTA_K2	10.8mg/ml	< 16.2
Sodium Heparin	54mg/ml	< 1.1
Sodium Citrate	40mg/ml	< 14.8

- **Precision**: The intra-assay precision was calculated by one evaluator, who tested different concentration of control standard twenty times each with three different lots of **ichroma™ T3.** The inter-assay precision was confirmed by 3 different evaluators for 5 days with 3 different lots, three times each different concentrations.

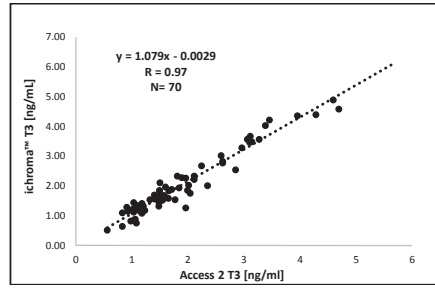
<Intra-assay>

T3 (ng/ml)	Lot 1		Lot 2		Lot 3	
	mean	CV(%)	mean	CV(%)	mean	CV(%)
control Lv. 1	0.70	11.8	0.72	8.6	0.67	9.2
control Lv. 2	1.54	6.0	1.56	5.0	1.46	6.2
control Lv. 3	4.15	3.5	4.16	4.0	3.97	4.5

<Inter-assay>

T3 (ng/ml)	Between Lot		Between run		Between day		Total	
	mean	CV(%)	mean	CV(%)	mean	CV(%)	mean	CV(%)
control Lv. 1	0.69	10.3	0.71	10.0	0.69	10.3	0.71	9.2
control Lv. 2	1.52	6.3	1.53	4.1	1.52	6.3	1.52	6.8
control Lv. 3	4.09	4.5	4.03	3.4	4.09	4.5	4.06	4.1

- **Comparability:** T3 concentrations of 70 serum samples were quantified independently with **ichroma™ T3** and Access2 (Beckman Coulter Inc. USA) as per prescribed test procedures. Test results were compared and their comparability was investigated with linear regression and coefficient of correlation (R). Linear regression and coefficient of correlation between the two tests were Y= 1.079X - 0.0029 and R = 0.97 respectively.



REFERENCES

1. O'Neil MJ, editor. The Merck Index. 13th ed. Whitehouse Station, NJ: Merck & Co., Inc., 2001;987-988.
2. Ekins RP. Methods for the measurement of free thyroid hormones. In: Free Thyroid Hormones: Proceedings of the International Symposium Held in Venice, December 1978. Amsterdam: Excerpta Medica; 1979:72-92.
3. Robbins J, Rall JE. The iodine-containing hormones. In: Gray CH, James VHT, eds. Hormones in Blood. Vol 1. 3rd ed. London: Academic Press, 1979;632-667.
4. Demers LM, Spencer CA, eds. Laboratory medicine practice guidelines: laboratory support for the diagnosis and monitoring of thyroid disease. Thyroid. 2003;13:3-126.
5. Hollander CS, Shenkman L. Radioimmunoassay for triiodothyronine and thyroxine. In; Rothfeld B, editor. Nuclear medicine in vitro. Philadelphia: Lippincott, 1974;136-49.
6. Kaplan MM, Larsen PR, Crantz FR, Dzau VJ, Rossing TH, Haddow JE. Prevalence of abnormal thyroid function test results in patients with acute medical illnesses. Am J Med. 1982;72:9-16.
7. Larsen PR. Triiodothyronine: Review of Recent Studies of Its Physiology and Pathophysiology in Man. Metabolism. 1972;21:1073-1092.
8. Klee GG. Clinical usage recommendations and analytical performance goals for total and free triiodothyronine measurements. Clin Chem. 1996;42:155-159.
9. Ivy HK, Wahner HW, Gorman CA. "Triiodothyronine (T3) toxicosis": its role in Graves' disease. Arch Intern Med. 1971;128:529-534.
10. Hollander CS, Mitsuma T, Nihei N, Shenkman L, Burday SZ, Blum M. Clinical and laboratory observations in cases of triiodothyronine toxicosis confirmed by radioimmunoassay. Lancet. 1972;1:609-611.
11. Sterling K, Refetoff S, Selenkow HA. T3 thyrotoxicosis: thyrotoxicosis due to elevated serum triiodothyronine levels. JAMA. 1970;213:571-575.
12. Kaplan MM, Larsen PR, Crantz FR, Dzau VJ, Rossing TH, Haddow JE. Prevalence of abnormal thyroid function test results in patients with acute medical illnesses. Am J Med. 1982;72:9-16.
13. Bermudez F, Surks MI, Oppenheimer JH. High incidence of decreased serum triiodothyronine concentration in patients with nonthyroid disease. J Clin Endocrinol Metab. 1975;41:27-40.
14. Oppenheimer JH. Thyroid function tests in nonthyroidal disease. J Chronic Dis. 1982;35:697-701.
15. Abuid J, Larsen PR. Triiodothyronine and thyroxine in hyperthyrodism: comparison of the acute changes during therapy with antithyroid agents. J Clin Invest. 1974;54:201-208.
16. Felig P, Frohman LA, eds. Endocrinology & Metabolism. 4th ed. New York: McGraw-Hill, Inc., 2001:270-311.
17. Bates HM. Clin Lab Prod 1974;3:16.
18. Utiger RD. Serum triiodothyronine in man. Annu Rev Med 1974;2:289-302.
19. Larson PR. Triiodothyronine: review of recent studies of its physiology and pathophysiology in man. Metabolism

1972;21:1073-92.
20. Oppenheimer JH. Role of plasma proteins in the binding, distribution and metabolism of the thyroid hormones. N Engl J Med 1968;278:1153-62.
21. http://cclnprod.cc.nih.gov/dlm/testguide.nsf/Index/8C30C39D10A6B79E85256BA7004F7E9E

Note: Please refer to the table below to identify various symbols

	Read instructions for use
	Use by
LOT	Batch code
REF	Catalog number
	Caution
	Manufacturer
EC REP	Authorized representative of the European Community
IVD	In vitro diagnostic medical device
	Temperature limit
	Do not reuse
CE	This product fulfills the requirements of the Directive 98/79/EC on in vitro diagnostic medical devices

For technical assistance; please contact:
Boditech Med Inc.'s Technical Services
Tel: +82 33 243-1400
E-mail: sales@boditech.co.kr

Boditech Med Incorporated
43, Geodudanji 1-gil, Dongnae-myeon,
Chuncheon-si, Gang-won-do 200-883
Republic of Korea
Tel: +(82) -33-243-1400
Fax: +(82) -33-243-9373
www.boditech.co.kr

EC REP **Obelis s.a**
Bd. Général Wahis 53,
1030 Brussels, BELGIUM
Tel: +(32) -2-732-59-54
Fax: +(32) -2-732-60-03
E-Mail: mail@obelis.net

CE