BIO TECHNOLOGY bodtech

Hormone

ichroma™ TSH Plus

INTENDED USE

ichroma™ TSH Plus is a fluorescence Immunoassay (FIA) for the quantitative determination of TSH in human whole blood/serum/plasma. It is useful as an aid in management and monitoring of measurement in the assessment of thyroid function.

For *in vitro* diagnostic use only.

INTRODUCTION

The determination of serum or plasma levels of thyroid stimulating hormone (TSH or thyrotropin) is recognized as an important measurement in the assessment of thyroid function. Thyroid stimulating hormone is secreted by the anterior lobe of the pituitary gland, and induces the production and release of thyroxine (T4) and triiodothyronine (T3) from the thyroid gland. It is a glycoprotein with a molecular weight of approximately 28,000 daltons, consisting of two chemically different subunits, alpha and beta. Although the concentration of TSH in the blood is extremely low, it is essential in the maintenance of normal thyroid function. The release of TSH is regulated by a TSH-releasing hormone (TRH) produced by the hypothalamus. The levels of TSH and TRH are inversely related to the level of thyroid hormone. When there is a high level of thyroid hormone in the blood, less TRH is released by the hypothalamus, so less TSH is secreted by the pituitary. The opposite action will occur when there are decreased levels of thyroid hormones in the blood. This process, known as a negative feedback mechanism, is responsible for maintaining the proper blood levels of these hormones.

PRINCIPLE

The test uses a sandwich immunodetection method; the detector antibodies in buffer bind to antigens in the sample, forming antigen-antibody complexes, and migrate onto nitrocellulose matrix to be captured by the other immobilized-antibody on test strip.

More antigens in the sample will form more antigen-antibody complexes which lead to stronger fluorescence signal by detector antibodies, which is processed by instrument for ichroma™ tests to show TSH concentration in the sample.

COMPONENTS

ichroma™ TSH Plus consists of 'cartridges', 'detectors', 'diluent'.

- The cartridge contains the membrane called a test strip which has streptavidin at the test line, and chicken IgY at the control line. All cartridges are individually sealed in an aluminum foil pouch containing a desiccant in a box.
- The detector has 2 granules containing anti human TSH-fluorescence conjugate, anti-human TSH-Biotin conjugate, anti-chicken IgY-fluorescence conjugate, bovine serum albumin (BSA) and sucrose as a stabilizer, bromophenol blue, MAB33 as blocker and sodium azide as a preservative in phosphate buffered saline (PBS). All detectors are packed in a pouch.
- The diluent contains bovine serum albumin (BSA) as a stabilizer, CA-630 and tween 20 as a surfactant, NaCl and sodium azide as a preservative in phosphate buffered saline (PBS) and it is pre-dispensed in a vial. The diluent is packed in a box and further packed in a Styrofoam box with ice-box for the shipment.

WARNINGS AND PRECAUTIONS

- For *in vitro* diagnostic use only.
- Follow instructions and procedures described in this 'Instruction for use'.
- Use only fresh samples and avoid direct sunlight.
- It is possible to use frozen samples. Please refer to "SAMPLE COLLECTION AND PROCESSING."
- Lot numbers of all the test components (cartridge, detector, diluent and ID chip) must match each other.
- Do not interchange test components between different lots or use test components after the expiration date, either of which might yield incorrect of test result(s).
- Do not reuse cartridges, detectors and capillary tubes. A cartridge should be used for testing one sample only. A detector should be used for processing one sample only. A capillary tube should be used for processing one sample only.
- After using the diluent, keep the lid of the diluent closed.
- The cartridge should remain sealed in its original pouch until just before use. Do not use cartridge, if pouch is damaged or has already been opened.
- Frozen sample should be thawed only once. For shipping, samples must be packed in accordance with local regulations. Sample with severe hemolysis and/or hyperlipidemia must not be used.
- Allow cartridge, detector, diluent and sample to be at room temperature for approximately 30 minutes before use.
- The instrument for ichroma™ tests may generate slight vibration during use.
- Used cartridges, detectors, diluent and pipette tips 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™ TSH Plus** will provide accurate and reliable results subject to the below conditions.
  - **ichroma™ TSH Plus** should be used only in conjunction with the instrument for ichroma™ tests.
  - Have to use recommended anticoagulant sample.

Recommended anticoagulant
Sodium heparin

[35 µL Capillary tube]

- Wear disposable gloves and protective equipment for safety.
- Do not reuse the capillary tubes as they are disposable.
- Check the surface for damage or contamination.
- Careful when collecting sample to prevent air bubbles from forming in the capillary tube.
- Careful not to get blood on the surface of the capillary tube. Wipe the surface of the capillary tube with tissue.
- Avoid placing them under direct sunlight and keep them in dry places.
- Unused capillary tubes must be stored in a sealed zipper bag.
- Sample collection tool and sample container are infectious and therefore must be handled carefully and discarded by an appropriate method in accordance with relevant local regulations.

STORAGE AND STABILITY

Storage condition			
Component	Storage Temperature	Shelf life	Note
Cartridge	4 – 30 °C	20 months	Disposable
Detector	2 – 8 °C	20 months	Disposable
Diluent	2 – 8 °C	20 months	Unopened
	2 – 8 °C	12 months	Opened

- After the 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(s) due to the non-responsiveness of the antigen to the antibodies which is the most common if the epitope is masked by some unknown components, so therefore not being able to be detected or captured by the antibodies. The instability or degradation of the antigen with time and/or temperature may also cause false negative result 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-45

Components of **ichroma™ TSH Plus**

- Cartridge Box
  - Cartridge 25
  - 35 µL Capillary tube 25
  - ID Chip 1
  - Instruction for Use 1
- Buffer Box
  - Detectors 25
  - Diluent 1

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **ichroma™ TSH Plus**.

Please contact our sales division for more information.

- Instrument for ichroma™ tests
  - **ichroma™ II** **REF** FPRR021
- **Boditech TSH Plus Control** **REF** CFPO-229

SAMPLE COLLECTION AND PROCESSING

The sample type for **ichroma™ TSH Plus** is human whole blood/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. If longer storage is required, e.g. if the test could not be performed within 24 hours, serum or plasma should be immediately frozen below -20 °C. The freezing storage of sample up to 3 months does not affect the quality of results.
- Once the sample was frozen, it should be thawed only once and only for test, because repeated freezing and thawing can result in the change of test values.
- Fingertip blood samples should be collected as follows:
  - Position the hand with the palm facing upwards. Blood should be normally drawn from the middle or ring finger of the non-dominant hand. Apply intermittent pressure towards its tip.
  - Wipe the fingertip clean with an alcohol pad.
  - Allow the finger to dry completely because blood will not form a drop if the puncture site is moist and because the residual alcohol at the fingertip may dilute the blood sample and affect the test result.
  - Hold the finger and puncture the fingertip by firmly pressing a new sterile lancet against it at an off-center position.
  - Wipe away the first drop of blood with a sterile gauze pad or cotton ball.
  - Massage the finger towards its tip to form a new drop of blood. Blood will flow easily if the finger is held lower than the elbow.
  - Hold the handle of a capillary tube and touch the mouth of the capillary to the drop of blood.
  - Let the blood fill the capillary tube completely.
    It may be sometimes necessary to massage the finger again for an additional drop of blood for filling the capillary tube.

TEST SETUP

- Check the contents of **ichroma™ TSH Plus**: Sealed Cartridges, Detectors, Diluent, Capillary tubes, an ID Chip and an instruction for use.
- Ensure that the lot number of the cartridge matches that of the detector, diluent as well as the ID chip.
- If the sealed cartridge, the detector and the diluent have

been stored in a refrigerator, place them on a clean and flat surface at room temperature for at least 30 minutes before testing.

- Turn on the instrument for ichroma™ tests.
  (Please refer to the 'Instrument for ichroma™ tests Operation Manual' for complete information and operating instructions.)

TEST PROCEDURE

< Multi Mode >

1) Transfer 150 µL of diluent using a pipette to a detector containing granules.
   When the granule form is completely dissolved in the tube, it becomes detection buffer.
   (The detection buffer must be used immediately within 30 seconds).
2) Transfer sample 35 µL (Human whole blood/serum/plasma/control) using a pipette to a detector.

※ If the test use whole blood, transfer the fingertip blood (collected in a capillary tube) to a detector.

3) Close the lid of the detector and mix the sample thoroughly by shaking about 20 times.
   (The sample mixture must be used within 30 seconds.)
4) Pipette out 75 µL of a sample mixture and load it into the sample well on the cartridge.
5) Leave the cartridge at room temperature for 12 minutes before inserting the device into the holder.
   ⚠ *Scan the sample-loaded cartridge immediately when the incubation time is over. If not, it will cause inaccurate test result.*
6) 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 is marked on the cartridge especially for this purpose.
7) Tap the 'START' button on the instrument for ichroma™ tests to start the scanning process.
8) The instrument for ichroma™ tests should start scanning the sample-loaded cartridge immediately.
9) Read the test result on the display screen of the instrument for ichroma™ tests.

< Single Mode >

1) The test procedure is same with 'Multi mode 1) ~ 4).
2) Inserting the device into the 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 is marked on the cartridge especially for this purpose.
3) Tap the 'START' button on the instrument for ichroma™ tests.
4) Cartridge goes inside the Instrument for ichroma™ tests and will automatically start scanning the sample-loaded cartridge after 12 minutes.
5) Read the test result on the display screen of the instrument for ichroma™ tests.
   (Please refer to the ichroma™ II operation manual for complete information and operation instructions.)

INTERPRETATION OF TEST RESULT

- The instrument for ichroma™ tests calculates the test result automatically and displays TSH concentration of the test sample in terms of µIU/mL.
- Cut-off (reference value)

State		TSH [µIU/mL]
Gestation and Childhood	0 day	1.0 - 39.0
	5 days	1.7 - 9.1
	1 years	0.4 - 8.6
	2 years	0.4 - 7.6
	3 years	0.3 - 6.7
	4 - 19 years	0.4 - 6.2
Adults	20 - 54 years	0.4 - 4.2
	55 - 87 years	0.5 - 8.9
Pregnancy	1st Trimester	0.3 - 4.5
	2nd Trimester	0.5 - 4.6
	3rd Trimester	0.8 - 5.2

- Working range: 0.1 – 50.0 µIU/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 provided on demand with **ichroma™ TSH Plus**. 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

- **Analytical sensitivity**

Limit of Blank (LOB)	0.05 µIU/mL
Limit of Detection (LOD)	0.08 µIU/mL
Limit of Quantitation (LOQ)	0.1 µIU/mL

- **Analytical specificity**
  - Cross-reactivity
    Biomolecules such as below the ones in the table were added to the test sample(s) at concentrations much higher than their normal physiological levels in the blood. **ichroma™ TSH Plus** test results did not show any significant cross-reactivity with these biomolecules.

Cross-reactivity material	Concentration
hCG	50,000 mIU/ml
LH	100 mIU/ml
FSH	100 mIU/ml

  - Interference
    Interference materials such as below the ones in the table were added to the test sample(s) the same as the below concentrations. **ichroma™ TSH Plus** test results did not show any significant interference with these materials.

Interference material	Concentration
Bilirubin(conjugated)	100 µmol/L
Cholesterol	13 mmol/L
D-glucose	55 mmol/L
Hemoglobin	300 g/L
L-Ascorbic acid	170 µmol/L
Triglyceride	20 mmol/L

■ **Precision**

- Between lot
  One person tested three different lots of **ichroma™ TSH Plus**, ten times at each concentration of the control standard.
- Between person
  Three different persons tested **ichroma™ TSH Plus**, ten times at each concentration of the control standard.
- Between day
  One person tested **ichroma™ TSH Plus** for five days, ten times at each concentration of the control standard.
- Between site
  One person tested **ichroma™ TSH Plus** at three different sites, ten times at each concentration of the control standard.

TSH	Between-lot		Between-person	
[µIU/ml]	AVG	CV (%)	AVG	CV (%)
0.5	0.50	6.69	0.50	6.10
5	5.02	5.24	5.01	5.64
25	25.10	5.84	24.82	5.61
TSH	Between-day		Between-site	
[µIU/ml]	AVG	CV (%)	AVG	CV (%)
0.5	0.50	6.85	0.51	5.82
5	5.10	5.74	4.98	5.34
25	25.42	5.93	24.73	5.59

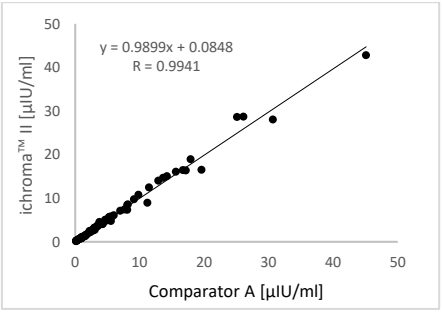
■ **Accuracy**

The accuracy was confirmed by testing with three different lots of **ichroma™ TSH Plus**. The tests are repeated ten times in each different concentration.

TSH	Lot1		Lot2		Lot3	
[µIU/ml]	AVG	Recovery	AVG	Recovery	AVG	Recovery
0.15	0.15	101%	0.15	100%	0.15	101%
0.5	0.51	102%	0.52	103%	0.50	100%
2.5	2.47	99%	2.61	104%	2.44	98%
12.7	12.42	98%	12.60	99%	12.81	101%
15	14.99	100%	15.42	103%	14.62	97%

■ **Comparability**

TSH concentration of 80 clinical samples were independently with **ichroma™ TSH Plus (ichroma™ II)** and Comparator A 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=0.9899x + 0.0848 and R = 0.9941.



REFERENCES

1. Marshaal, J.C.: Clinic. In Endocrinol. Metab, 1975, 4:545.
2. Burger, H. G., Patel, Y. C. Thyrotropin releasing hormone-TSH. J. Clinic. Endocrinol. Metab. 1977, 6:831-00.
3. Jeffcoate, S.L.: Clinic. In Endocrinol. Metab. 1975, 4:521.
4. Cohen, K.L.: Metabolism, 1977, 26:1165.
5. Pierce, J. G. Endocrinology. 1971, 89:1331-1344.
6. Berger, S. and Quinn, J.L., Fund. Clin. Chem., N. W. Tietz(ed.), W. B. Saunders Co., Phila., PA 14, 824-848(1976).
7. Lundy, L.E., Lee, S.G., Levy, W., et al. Obstet. Gynecol. 1974, 44:14
8. Utiger, R. D., The Thyroid, S.C. Werner and S. H. Ingbar(eds.), Harper and Row, Hagerstown, MD, 1978, 9:196-205.
9. Clinical Guide to Laboratory Tests. Ed. N.W. Tietz, 3rd Ed., W.B. Saunders Company, Philadelphia, PA 19106, 1995

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

Σ	Sufficient for <n> tests
	Read instruction for use
	Use by Date
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

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