QDx Instacheck™ T4

INTENDED USE

QDx Instacheck™ T4 is a fluorescence Immunoassay (FIA) for the quantitative determination of thyroxine (T4) in human serum/plasma. It is useful as an aid in management and monitoring of thyroid disorder. For *in vitro* diagnostic use only.

INTRODUCTION

Thyroxine (T4) is one of two major hormones produced by the thyroid gland (the other is called triiodothyronine, or T3). T4 and T3 are regulated by a sensitive feedback system involving the hypothalamus and the pituitary gland. The hypothalamus releases the thyrotropin-releasing hormone (TRH), which stimulates the pituitary to release the thyroid stimulating hormone (TSH). This causes the thyroid to release T3 and T4 and these in turn regulate the release of TRH and TSH via a feedback control mechanism. Normally, elevated blood levels of T4 and T3 act to decrease the amount of TSH secreted, thereby reducing the production and release of T4 and T3. Over 99% of T4 is reversibly bound to three plasma proteins in blood: thyroxine binding globulin (TBG) binds close to 70%, thyroxine binding pre-albumin (TBPA) binds 20%, and albumin binds 10%. Approximately 0.03% of T4 is in the free, unbound state in blood at any one time.

T4 is a useful marker for the diagnosis of hypothyroidism and hyperthyroidism. The level of T4 decreases in hypothyroidism, myxedema and chronic thyroiditis (Hashimoto's disease). Increased levels of T4 have been found in hyperthyroidism due to Grave's disease and Plummer's disease.

PRINCIPLE

The test uses a competitive immunodetection method.
In this method, the analyte in the sample binds to the fluorescence labeled (FL) 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 T4 and bovine serum albumin (BSA) is immobilized, and interferes with the binding of analyte and fluorescence labeled (FL) antibody. If more analytes exist in the sample, less detection antibodies are accumulated, resulting in less fluorescence signal.

COMPONENTS AND REAGENTS

QDx Instacheck™ T4 consists of 'cartridges', 'detector tubes', 'a detector diluent'.

- The cartridge contains the membrane called a test strip which has T4-BSA conjugate at the test line, and streptavidin at the control line. All cartridges are individually sealed in an aluminum foil pouch containing a desiccant in a box.
- The detector tube contains anti human T4-fluorescence conjugate, biotin-BSA-fluorescence conjugate, mouse IgG as a blocker, bovine serum albumin and sucrose as a stabilizer sodium azide in phosphate buffered saline(PBS).
- The detector diluent contains ANS, bovine serum albumin, tween 20 and sodium azide in phosphate buffered saline(PBS).

WARNINGS AND PRECAUTIONS

- For *in vitro* diagnostic use only.
- 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 (cartridge, detector tube, detector diluent and ID chip) 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 cartridges or detector tubes. A cartridge should be used for testing one sample only. A detector tube should be used for processing of one sample only.
- The cartridge should remain sealed in its original pouch until just before use. Do not use the 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 the local regulations. Sample with severe hemolysis and/or hyperlipidemia must not be used.
- Allow cartridge, detector tube, detector diluent and sample to be at room temperature for approximately 30 minutes.
- The instrument for QDx Instacheck™ tests may generate slight vibration during use.
- Used cartridges, detector tubes, detector 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.
- No Biotin interference was observed in QDx Instacheck™ when biotin concentration in the sample was below 20 ng/mL. If a patient has been taking biotin at dosage of more than 0.03 mg a day, it is recommended to test again 24 hours after discontinuation of biotin intake.
- **QDx Instacheck™ T4** will provide accurate and reliable results subject to the below conditions.
  - **QDx Instacheck™ T4** should be used only in conjunction with instrument for QDx Instacheck™ tests.
  - Have to use recommended anticoagulant sample.

Recommended anticoagulant
Sodium citrate, Sodium heparin

STORAGE AND STABILITY

Component	Storage condition: Storage Temperature	Shelf life	Note
Cartridge	4 - 30 °C.	20 months	Disposable
Detector tube	4 - 30 °C.	20 months	Disposable
Detector diluent	4- 30 °C.	20 months	Unopened
	4- 30 °C.	3 months	Opened

- After the cartridge pouch is opened, the test should be performed immediately.

LIMITATIONS 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 **IFPC-9**

Components of QDx Instacheck™ T4

- Cartridge Box:
  - Cartridges 25
  - ID Chip 1
  - Instruction for Use 1
  - Detector tube (Granule) 25
  - Detector diluent (6 mL) 1

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **QDx Instacheck™ T4**.

Please contact our sales division for more information.

- Instrument for QDx Instacheck™ tests
  - **QDx Instacheck™ Reader** REF FPRR010
  - **QDx Instacheck™ II** REF FPRR039
- **Printer** REF FPRR007
- **i-Chamber** REF FPRR009
- **Boditech Hormone Control** REF CFPO-95
- **Boditech T4 Control** REF CFPO-237

SAMPLE COLLECTION AND PROCESSING

The sample type for **QDx Instacheck™ T4** 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 month at 2-8 °C prior to being tested. If testing will be delayed more than a month, samples should be frozen at -20 °C.
- Samples stored frozen at -20 °C for 3 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 **QDx Instacheck™ T4**: Sealed Cartridges, Detector tubes, a Detector diluent, an ID Chip and an Instruction for use.
- Ensure that the lot number of the cartridges matches that of the detector tubes as well as the detector diluents and the ID chip.
- If the sealed cartridge and the detection buffer 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 QDx Instacheck™ tests.
  (Please refer to the 'Instrument for QDx Instacheck™ tests Operation Manual' for complete information and operating instructions.)

CAUTION

- To minimize erroneous test results, we suggest that the ambient temperature of the cartridge should be 25 °C during the reaction time after loading sample mixture to the cartridge.
- To maintain the ambient temperature to 25 °C, you can use various devices such as an i-Chamber or an incubator and so on.

TEST PROCEDURE

1. Transfer 200 µL of detector diluent using a pipette to a detector tube containing granule. When the granule is completely dissolved in the detector tube, it becomes detection buffer.
   (The detection buffer must be used within 3 minutes right after dissolving the granule.)
2. Transfer 75 µL of sample (Human serum/plasma/ control) using a transfer pipette to a detector tube containing detection buffer.
3. Mix well by pipetting 10 times.
4. Close the lid of the detector tube and mix the sample thoroughly by shaking it about 10 times.
5. Incubate the detection buffer + 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 cartridge.
7. Insert the sample-loaded test cartridge into the slot of the i-Chamber or an incubator (25 °C).
8. Leave the sample-loaded cartridge in the i-Chamber or an incubator for 8 minutes.
   ⚠ *Scan the sample-loaded cartridge immediately when the incubation time is over. If not, it will cause inaccurate test result.*
9. To scan the sample-loaded cartridge, insert it into the cartridge holder of the instrument for QDx Instacheck™ 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.
10. Press the 'Select' or Tab the 'Start' button on the instrument for QDx Instacheck™ tests to start the scanning process.
11. Instrument for QDx Instacheck™ tests will start scanning the sample-loaded cartridge immediately.
12. Read the test result on the display screen of the instrument for QDx Instacheck™ tests.

INTERPRETATION OF TEST RESULT

- Instrument for QDx Instacheck™ tests calculates the test result automatically and displays T4 concentration of the test sample in terms of nmol/L and µg/dL.
- T4 Conversion factor is 12.87 (nmol/L = 12.87 X µg/dL)
- The cut-off (reference range)

State	Range
Normal value	57.9-150.6 nmol/L

- Working range: 10.23-300.0 nmol/L

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 **QDx Instacheck™ T4**. 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)	7.08 nmol/L
Limit of Detection	(LoD)	8.20 nmol/L
Limit of Quantification	(LoQ)	10.23 nmol/L

- **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. **QDx Instacheck™ T4** test results did not show any significant cross-reactivity with these biomolecules.

Interference materials	Concentration
l-Triiodothyronine	500 ng/ml
reverse T3	500 ng/ml
l-Thyrosine	300 ng/ml
d-Thyrosine	300 ng/ml
3-Iodo-L-tyrosine	500 ng/ml
salicylic acid	1,000,000 ng/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. **QDx Instacheck™ T4** test results did not show any significant interference with these materials.

Cross reactivity materials	Concentration
D-glucose	60 mM/L
L-Ascorbic acid	0.2 mM/L
Bilirubin	0.4 mM/L
Hemoglobin	2 g/L
Cholesterol	13 mM/L
Triglyceride	10 mg/mL

- **Precision**

3 Lots of **QDx Instacheck™ T4** were tested for 21days (7days per 1 Lot at 1 site by one operator). Each standard material was tested 2 times per day. For each test, each material was duplicated.

- **Repeatability (within-run precision)**

Repeatability of **QDx Instacheck™ T4** was evaluated with results of 1 Lot.

- **Total precision (within-laboratory)**

Total precision (within-run, between-run, between-day) of **QDx Instacheck™ T4** was evaluated with results of 1 Lot.

- **Lot to lot precision**

Lot to lot precision of **QDx Instacheck™ T4** was evaluated with results of 3 Lots.

Reference Material [nmol/L]	Repeatability		Total precision		Lot to lot precision	
	AVG	CV (%)	AVG	CV (%)	AVG	CV (%)
50	49.90	6.05	50.21	6.2	50.31	6.00
100	99.58	6.95	99.91	6.5	100.52	6.31
150	149.73	6.94	150.01	6.7	150.01	6.32

- Between person

Three different persons tested **QDx Instacheck™ T4**; ten times at each concentration of the control standard.

- Between site

One person tested **QDx Instacheck™ T4** at three different sites; three times at each concentration of the control standard.

Reference Material [nmol/L]	Between site		Between person	
	AVG	CV (%)	AVG	CV (%)
50	49.45	3.08	50.21	2.63
100	101.30	6.31	99.32	6.24
150	148.74	9.43	149.75	10.18

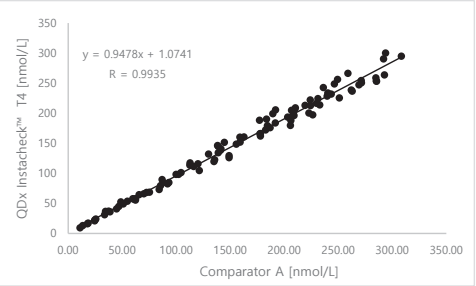
- **Accuracy**

The accuracy was confirmed by 3 different lots testing ten times each different concentration.

Expected value [nmol/L]	Lot 1	Lot 2	Lot 3	AVG	Recovery (%)
150	149.35	146.51	148.30	148.05	98.702
75	74.32	74.40	71.90	73.54	98.1
50	47.36	48.77	47.66	47.93	95.9
25	25.29	24.38	24.23	24.63	98.5
12.5	12.33	11.84	12.11	12.09	96.7

- **Comparability:**

T4 concentrations of 100 serum samples were quantified independently with **QDx Instacheck™ T4 (QDx Instacheck™ 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= 0.9478x + 1.0741 and R = 0.9935 respectively.



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

	Sufficient for <n> tests
	Read instruction for use
	Use by Date
	Batch code
	Catalog number
	Caution
	Manufacturer
	Authorized representative of the European Community
	In vitro diagnostic medical device
	Temperature limit
	Do not reuse
	This product fulfills the requirements of the Directive 98/79/EC on in vitro diagnostic medical devices

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