

# MAGLUMI T4 (CLIA)



130203002M



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## FOR PROFESSIONAL USE ONLY

Store at 2...8 °C



COMPLETELY READ THE INSTRUCTIONS BEFORE  
PROCEEDING



## SYMBOLS EXPLANATIONS



Authorized Representative in Europe



Manufacturer



Attention. See Instructions For Use



Contents of kit



In vitro diagnostic medical device  
(In vitro diagnostic use)



Lot number



Catalogue Code



Expiry date (Use by...)



Temperature limitation  
(store at 2...8 °C)



Number of tests



Keep away from sunlight



Keep upright

## INTENDED USE

The kit has been designed for the quantitative determination of Thyroxine (T4) in human serum.

The method can be used for samples over the range of 0-300 ng/ml.

The test has to be performed on the MAGLUMI chemiluminescence immunoassay (CLIA) fully auto analyzer (Including MAGLUMI 1000, MAGLUMI 2000, MAGLUMI 2000 Plus and new developed models).

## SUMMARY AND EXPLANATION OF THE TEST

Total T4 and free T4 are two separate tests that can help a doctor evaluate thyroid function. The total T4 test has been used for many years to help diagnose hyperthyroidism and hypothyroidism. It is a useful test but can be affected by the amount of protein available in the blood to bind to the hormone. The free T4 test is a newer test that is not affected by protein levels. Since free T4 is the active form of thyroxine, the free T4 test is thought by many to be a more accurate reflection of thyroid hormone function and, in most cases, its use has replaced that of the total T4 test. Whichever thyroxine measurement is ordered, it is usually ordered along with or following a TSH test. This helps the doctor to determine whether the thyroid hormone feedback system is functioning as it should, and the results of the tests help to distinguish between different causes of hyperthyroidism and hypothyroidism. Sometimes a T3 test will also be ordered to give the doctor additional diagnostic information.

A T4 and TSH test may be ordered to help evaluate a person with a goiter and to aid in the diagnosis of female infertility. If a doctor suspects that someone may have an autoimmune-related thyroid condition, then thyroid antibodies may be ordered along with a T4 test. In those with known thyroid dysfunction, T4 and/or TSH tests may be ordered to monitor thyroid function.

Newborns are commonly screened for T4 levels as well as TSH concentrations to check for congenital hypothyroidism, which can cause mental retardation if left untreated.

A total T4 or free T4 test is primarily ordered in response to an abnormal TSH test result. Sometimes the T4 will be ordered along with a TSH to give the doctor a more complete evaluation of the adequacy of the thyroid hormone feedback system. These tests are usually ordered when a person has symptoms of hyperthyroidism or hypothyroidism.

Signs and symptoms of hyperthyroidism may include: Increased heart rate; Anxiety; Weight loss; Difficulty sleeping; Tremors in the hands; Weakness; Diarrhea (sometimes); Light sensitivity, visual disturbances.

The eyes may be affected: puffiness around the eyes, dryness, irritation, and, in some cases, bulging of the eyes.

Symptoms of hypothyroidism may include: Weight gain, Dry skin, Constipation, Cold intolerance, Puffy skin, Hair loss, Fatigue, Menstrual irregularity in women.

Severe untreated hypothyroidism, called myxedema, can lead to heart failure, seizures, and coma. In children, hypothyroidism can stunt growth and delay sexual development.

Sometimes they are ordered as screening tests during routine blood testing, but expert opinions vary on who can benefit from screening and at what age to begin. In those with known thyroid disorders, the TSH and sometimes T4 are ordered at intervals to monitor the effectiveness of treatment. In pregnant women with thyroid disorders, the doctor is likely to order thyroid testing early and late in the pregnancy and for a time period following delivery to monitor the mother and baby. Thyroid hormone screening is commonly performed on newborns as part of newborn screening programs.

## PRINCIPLE OF THE TEST

Competitive immunoluminometric assay:

Use an anti-T4 monoclonal antibody to label ABEI, and use a purified T4 antigen to label FITC. Sample, Calibrator, or Control are mixed thoroughly with ABEI Label, FITC Label and nano magnetic microbeads in a cuvette, and then incubated at 37 °C, forming antibody-antigen complexes; after sediment in a magnetic field, suck the supernatant, then cycle washing cuvette for 1 time. Subsequently, Starter 1+2 substrates are added and a flash chemiluminescent reaction is initiated. The light signal is measured by a photomultiplier as RLU within 3 seconds and is proportional to the concentration of T4 present in controls or samples.

**CONT**

## KIT COMPONENTS

### Material Supplies

Reagent Integral for 100 determinations	
<b>Nano magnetic microbeads:</b> TRIS buffer, 1.2% (W/V), 0.2%NaN <sub>3</sub> , coated with sheep anti- FITC polyclonal antibody.	2.5ml
<b>Calibrator Low:</b> bovine serum, 0.2%NaN <sub>3</sub>	2.5ml
<b>Calibrator High:</b> bovine serum, 0.2%NaN <sub>3</sub>	2.5ml
<b>FITC Label:</b> purified T4 antigen labeled FITC, containing BSA, 0.2%NaN <sub>3</sub> .	6.5ml
<b>ABEI Label:</b> anti-T4 monoclonal antibody labeled FITC, containing BSA, 0.2%NaN <sub>3</sub> .	6.5ml
All reagents are provided ready-to-use.	

Reagent Vials in kit box	
<b>Internal Quality Control:</b> containing BSA, 0.2%NaN <sub>3</sub> . (target value refer to Quality Control Information date sheet)	2.0ml

### Accessories Required But Not Provided

MAGLUMI Reaction Module	REF: 630003
MAGLUMI Starter 1+2	REF: 130299004M
MAGLUMI Wash Concentrate	REF: 130299005M
MAGLUMI Light Check	REF: 130299006M



### Preparation of the Reagent Integral

Before the sealing is removed, gentle and careful horizontal shaking of the Reagent Integral is essential (avoid foam formation!) Remove the sealing and turn the small wheel of the magnetic microbeads compartment to and fro, until the colour of the suspension has changed into brown. Place the Integral into the reagent area and let it stand there for 30 min. During this time, the magnetic microbeads are automatically agitated and completely resuspended.

**Do not interchange integral component from different reagents or lots!**

### Storage and Stability

- Sealed: Stored at 2-8 °C until the expiry date.
- Opened: Stable for 4 weeks. To ensure the best kit performance, it is recommended to place opened kits in the refrigerator if it's not going to be used on board during the next 12 hours.



- Keep upright for storage.



- Keep away from direct sunlight.

## CALIBRATION AND TRACEABILITY

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### 1) Traceability

To perform an accurate calibration, we have provided the test calibrators standardized against the W.H.O.1st International Reference Preparation NIBSC 75/537.

### 2) 2 -Point Recalibration

Via the measurement of calibrators, the predefined master curve is adjusted (recalibrated) to a new, instrument-specific measurement level with each calibration.

### 3) Frequency of Recalibration

- After each exchange of lots (Reagent Integral or Starter Reagents).
- Every week and/or each time a new Integral is used (recommendation).
- After each servicing of the MAGLUMI Fully Auto analyzer.
- If controls are beyond the expected range.

## SPECIMEN COLLECTION AND PREPARATION

Sample material: serum

Collect samples using standard procedures.

Store at 2-8 °C: 24 hours, for lo

below - 20 °C

Avoid repeated freezing and thawing cycles, stored samples should be thoroughly mixed prior to use (Vortex mixer).

Please ask local representative of SNIBE for more details if you have any doubt.

### Vacuum Tubes

- Blank tubes are recommended type for collecting samples.
- Please ask SNIBE for advice if special additive must be used in sample collecting.

### Specimen Conditions

- Do not use specimens with the following conditions:
  - heat-inactivated specimens;
  - Cadaver specimens or body fluids other than human serum;
  - Obvious microbial contamination.
- Use caution when handling patient specimens to prevent cross contamination. Use of disposable pipettes or pipette tips is recommended.
- Inspect all samples for bubbles. Remove bubbles with an applicator stick prior to analysis. Use a new applicator stick for each sample to prevent cross contamination.
- Serum specimens should be free of fibrin, red blood cells or other particulate matter.
- Ensure that complete clot formation in serum specimens has taken place prior to centrifugation. Some specimens, especially those from patients receiving anticoagulant or thrombolytic therapy, may exhibit increased clotting time. If the specimen is centrifuged before a complete clot forms, the presence of fibrin may cause erroneous results.

### Preparation for Analysis

- Patient specimens with a cloudy or turbid appearance must be centrifuged prior to testing. Following centrifugation, avoid the lipid layer (if present) when pipetting the specimen into a sample cup or secondary tube.
- Specimens must be mixed **thoroughly** after thawing by **low** speed vortexing or by gently inverting, and centrifuged prior to use to remove red blood cells or particulate matter to ensure consistency in the results. Multiple freeze-thaw cycles of specimens should be avoided.
- All samples (patient specimens or controls) should be tested within 3 hours of being placed on board the MAGLUMI System. Refer to the SNIBE service for a more detailed discussion of onboard sample storage constraints.

### Storage

- If testing will be delayed for more than 8 hours, remove serum or plasma from the serum or plasma separator, red blood cells or clot. Specimens removed from the separator gel, cells or clot may be stored up to 24 hours at 2-8°C.
- Specimens can be stored up to 30 days frozen at -20°C or colder.

### Shipping

- Before shipping specimens, it is recommended that specimens be removed from the serum or plasma separator, red blood cells or clot. When shipped, specimens must be packaged and labeled in compliance with applicable state, federal and international regulations covering the transport of clinical specimens and infectious substances. Specimens must be shipped frozen (dry ice). Do not exceed the storage time limitations identified in this section of the package insert.

## WARNING AND PRECAUTIONS FOR USERS



- For use in *IN-VITRO* diagnostic procedures only.
- Package insert instructions must be carefully followed. Reliability of assay results cannot be guaranteed if there are any deviations from the instructions in this package insert.

### Safety Precautions

**CAUTION:** This product requires the handling of human specimens.

- The calibrators in this kit are prepared from bovine serum products. However, because no test method can offer complete assurance that HIV, Hepatitis B Virus or other infectious agents are absent; these reagents should be considered a potential biohazard and handled with the same precautions as applied to any serum or plasma specimen.
- All samples, biological reagents and materials used in the assay must be considered potentially able to transmit infectious agents. They should therefore be disposed of in accordance with the prevailing regulations and guidelines of the agencies holding jurisdiction over the laboratory, and the regulations of each country. Disposable materials must be incinerated; liquid waste must be decontaminated with sodium hypochlorite at a final concentration of 5% for at least half an hour. Any materials to be reused must be autoclaved using an overkill approach (USP 24, 2000, p.2143). A minimum of one hour at 121 °C is considered adequate, though the users must check the effectiveness of their decontamination cycle by initially validating it and routinely using biological indicators.
- It is recommended that all human sourced materials be considered potentially infectious and handled in accordance with the OSHA Standard on Bloodborne Pathogens 13. Biosafety Level 214 or other appropriate biosafety practices should be used for materials that contain or are suspected of containing infectious agents.
- This product contains Sodium Azide; this material and its container must be disposed of in a safe way.
- Safety data sheets are available on request.

### Handling Precautions

- Do not use reagent kits beyond the expiration date.
- Do not mix reagents from different reagent kits.
- Prior to loading the Reagent Kit on the system for the first time, the microbeads requires mixing to re-suspend microbeads that have settled during shipment.
- For microbeads mixing instructions, refer to the KIT COMPONENTS, Preparation of the Reagent Integral section of this package insert.
- To avoid contamination, wear clean gloves when operating with a reagent kit and sample.

- Over time, residual liquids may dry on the kit surface, please pay attention the silicon film still exists on the surface of the kit.
- For a detailed discussion of handling precautions during system operation, refer to the SNIBE service information.

## TEST PROCEDURE

To ensure proper test performance, strictly adhere to the operating instructions of the MAGLUMI Fully Auto analyzer. Each test parameter is identified via a RFID tag on the Reagent Integral. For further information please refer to the MAGLUMI Chemiluminescence Analyzer Operating Instructions.

40µl	Sample, calibrator or controls
+40µl	ABEI label
+40µl	FITC label
+20µl	Nano magnetic microbeads
15min	Incubation
400µl	Cycle washing
3 s	Measurement

## DILUTION

Sample dilution by analyzer is not available in this reagent kit.

Samples with concentrations above the measuring range can be diluted manually. After manual dilution, multiply the result by the dilution factor.

Please choose applicable diluents or ask SNIBE for advice before manual dilution must be processed.

## QUALITY CONTROL

- Observe quality control guidelines for medical laboratories.
- Use suitable controls for in-house quality control. Controls should be run at least once every 24 hours when the test is in use, once per reagent kit and after every calibration. The control intervals should be adapted to each laboratory's individual requirements. Values obtained should fall within the defined ranges. Each laboratory should establish guidelines for corrective measures to be taken if values fall outside the range.

## LIMITATIONS OF THE PROCEDURE

### 1) Limitations

In general, high free or total T4 results may indicate an overactive thyroid gland (hyperthyroidism), and low free or total T4 results may indicate an underactive thyroid gland (hypothyroidism). The test results alone are not diagnostic but will prompt the doctor to perform additional testing to investigate the cause of the excess or deficiency. Both decreased and increased T4 results are associated with a variety of temporary and chronic thyroid conditions. Low T4 results in conjunction with a low TSH level or high T4 results along with a high TSH may indicate a pituitary gland condition.

The following table summarizes test results and their potential meaning.

TSH	T4	T3	INTERPRETATION
High	Normal	Normal	Mild (subclinical) hypothyroidism
High	Low	Low or normal	Hypothyroidism
Low	Normal	Normal	Mild (subclinical) hyperthyroidism
Low	High or normal	High or normal	Hyperthyroidism
Low	Low or normal	Low or normal	Non-thyroidal illness; rare pituitary (secondary) hypothyroidism

Many medications—including estrogen, certain types of birth control pills, and large doses of aspirin—can affect total T4 test results and their use should be discussed with the doctor prior to

testing. In general, free T4 levels are not affected by these medications.

## 2) Interfering Substances

No interference with test results is seen by concentrations of bilirubin <0.06mg/ml, haemoglobin <16mg/dl or triglycerides<12.5mg/ml.

## 3) HAMA

Patient samples containing human anti-mouse antibodies (HAMA) may give falsely elevated or decreased values. Although HAMA-neutralizing agents are added, extremely high HAMA serum concentrations may occasionally influence results.

## RESULTS

### 1) Calculation of Results

- The analyzer automatically calculates the T4 concentration in each sample by means of a calibration curve which is generated by a 2-point calibration master curve procedure. The results are expressed in ng/ml. For further information please refer to the MAGLUMI® Chemiluminescence Analyzer Operating Instructions.
- Conversion factor: 1 ng/ml = 1.287 nmol/L.

### 2) Interpretation of Results

- Results of study in clinical centers with group of individuals, 95% of the results were: 52-127 ng/ml.
- Results may differ between laboratories due to variations in population and test method. If necessary, each laboratory should establish its own reference range.

## PERFORMANCE CHARACTERISTICS

### 1) Precision

Intra-assay coefficient of variation was evaluated on 3 different levels of control serum repeatedly measured 20 times in the same run, calculating the coefficient of variation.

Intra-assay precision			
Control	Mean(ng/ml)	SD(ng/ml)	CV%
Level 1	87.48	6.35	7.26%
Level 2	120.56	7.52	6.27%
Level 3	200.45	13.2	6.59%

Inter-assay coefficient of variation was evaluated on three batches of kit. Repeatedly measured 3 different levels of control serum 21 times, calculating the coefficient of variation.

Inter-assay precision			
Control	Mean(ng/ml)	SD(ng/ml)	CV%
Level 1	92.45	8.13	8.79%
Level 2	114.92	10.35	9.01%
Level 3	162.63	14.56	8.95%

### 2) Analytical Sensitivity

The sensitivity is defined as the concentration of T4 equivalent to the mean RLU of 20 replicates of the zero standard plus two standard deviations corresponding to the concentration from the standard curve. The sensitivity is typically less than 5 ng/ml.

### 3) Specificity

The specificity of the T4 assay system was assessed by measuring the apparent response of the assay to various potentially cross reactive analytes.

Compound	Concentration	Cross reactivity
T3	100 ng/ml	0.5%
rT3	100 ng/ml	0.8%

### 4) Recovery

Consider calibrator high of known concentration as a sample, dilute it by 1:2 ratio with diluents, and measure its diluted concentration for 10 times. Then calculate the recovery of measured concentration and expected concentration. The recovery should be within 90% -110%.

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Expected	Mean Measuring	Recovery
89.9 ng/ml	92.6 ng/ml	103%

## 5) Linearity

Use T4 calibrator to prepare the six-point standard curve, measuring all points' RLU except point A, and then do four-parameter linear fitting in double logarithm coordinate, the absolute linear correlation coefficient(r) should be bigger than 0.9800.

Calibrator Point	Concentration ng/ml	Absolute linear correlation coefficient (r)
A	0	
B	20	r=0.9816
C	40	
D	80	
E	150	
F	300	

## 6) Method comparison

A comparison of MAGLUMI T4(y) with a commercially available T4(x) using clinical samples gave the following correlations (nmol/L):

Linear regression

$$y=0.95x+40.1$$

$$r=0.961$$

$$S_{y.x}=80.0$$

Number of samples measured: 200

The sample concentrations were between 10-272nmol/ml

## REFERENCES

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