Brown Clinic Northridge
511 14th Ave. NE
Watertown, SD

Brown Clinic
506 First Ave. SE
Watertown, SD

PROCEDURE: Thyroid Stimulating Hormone Flex® reagent cartridge LOCI® Module

PURPOSE:

The TSHL method is an *in vitro* diagnostic test for the quantitative measurement of Thyroid Stimulating Hormone (TSH, thyrotropin) in human serum and plasma on the Dimension® EXL™ integrated chemistry system with LOCI® Module. Measurements of TSH are used in the diagnosis and monitoring of thyroid disease. Thyroid stimulating hormone is a glycoprotein secreted by the anterior lobe of the pituitary gland. TSH stimulates the normal thyroid gland to synthesize and secrete thyroxine (T4) and triiodothyronine (T3).[1] Although less sensitive measurements of TSH (or free T4) can be used to diagnose severe, clinically apparent hypo- or hyperthyroidism, only a highly sensitive TSH assay has sufficient clinical sensitivity to detect the minor degrees of thyroxine excess or deficiency associated with early, subclinical phases of hypo- or hyperthyroidism.[1,2] The TSHL assay meets the criteria of a "third generation" assay, defined as a functional sensitivity of ≤ 0.02 mIU/L with a between-run coefficient of variation (CV) of $\leq 20\%$.[2]

PRINCIPLE: The TSHL method is a homogeneous, sandwich chemiluminescent immunoassay based on LOCI® technology. The LOCI® reagents include two synthetic bead reagents and a biotinylated anti-TSH monoclonal antibody fragment. The first bead reagent (Sensibeads) is coated with streptavidin and contains a photosensitizer dye. The second bead reagent (Chemibeads) is coated with a second anti-TSH monoclonal antibody and contains chemiluminescent dye. Sample is incubated with biotinylated antibody and Chemibeads to form bead-TSH-biotinylated antibody sandwiches. Sensibeads are added and bind to the biotin to form bead-pair immunocomplexes. Illumination of the complex at 680 nm generates singlet oxygen from Sensibeads which diffuses into the Chemibeads, triggering a chemiluminescent reaction. The resulting signal is measured at 612 nm and is a direct function of the TSH concentration in the sample.[3,4]

INSTRUMENT, REAGENTS & SUPPLIES:

Wells[a,b]	Form	Ingredient	Concentration[c]	Source
1 – 2	Liquid	Biotinylated TSH antibody	7.5 µg/mL	Mouse monoclonal
3 – 4	Liquid	TSH antibody coated Chemibeads	200 µg/mL	Mouse monoclonal
5 – 6	Liquid	Streptavidin Sensibeads	1400 µg/mL	Recombinant *E. coli*
7 – 8	Empty			

a. Wells are numbered consecutively from the wide end of the cartridge.
b. Wells 1 – 6 contain buffers, stabilizers and preservatives.
c. Nominal value per well in a cartridge.

Risk and Safety:

H317

P280, P272, P302 + P352, P333 + P313, P501

Warning!

May cause an allergic skin reaction.

Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing should not be allowed out of the workplace. IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice /attention. Dispose of contents and container in accordance with all local, regional, and national regulation.

Contains: 5-chloro-2-methyl-3(2h)-isothiazolone mixture with 2-methyl-3(2h)-isothiazolone.

Safety data sheets (MSDS/SDS) available on www.siemens.com/healthcare

Precautions: Used HM reaction vessels contain human body fluids; handle with appropriate care to avoid skin contact or ingestion.

For *in vitro* diagnostic use

REAGENT STORAGE & STABILITY:

Reagent Preparation: All reagents are liquid and ready to use.

Store at: 2 – 8 °C

Expiration: Refer to carton for expiration date of individual unopened reagent cartridges. Sealed wells on the instrument are stable for 30 days.

Open Well Stability: 3 days for wells 1 – 6

SPECIMEN REQUIREMENTS:

Specimen Collection and Handling: Recommended specimen types: serum, lithium and sodium heparin plasma, EDTA plasma.

Samples and controls stabilized with sodium azide cannot be used.

Sample Stability:

Room Temperature: 1 day

Refrigerated at 2-8^{o}C: 7 days

Frozen at -20^{o}C: 1 month

Avoid repeated freezing and thawing.

Specimens must be free of particulate matter. To prevent the appearance of fibrin in serum samples, complete clot formation should take place before centrifugation. If clotting time is increased due to thrombolytic or anticoagulant therapy, the use of plasma specimens will allow for faster sample processing and reduce the risk of particulate matter.[8]

Follow the instructions provided with your specimen collection device for use and processing.[9]

The purpose of specimen storage information is to provide guidance to users; however, users may validate their own procedures for storing patient samples.

CONTROLS:

At least once daily run solutions at two levels of a quality control material with known concentrations.

For further details, refer to your Dimension® system manual. The result obtained should fall within limits defined by the day-to-day variability of the system as measured in the user's laboratory. If the results fall outside the laboratory's acceptable limits, follow the procedure in the quality control policy.

PROCEDURE:

Materials Provided

TSHL Flex® reagent cartridge, Cat. No. RF612

Materials Required But Not Provided

LOCI Thyroid Calibrator, Cat. No. RC610/RC610A
MULTI 2 Sample Diluent, Cat. No. KD694
TSH Sample Diluent, Cat. No. KD691
HM reaction vessels, Cat. No RXV1A
Quality Control Materials

Test Steps

Sampling, reagent delivery, mixing, and processing are automatically performed by the Dimension® EXL™ with LM System. For details of this processing, refer to your Dimension® EXL™ with LM Operator's Guide.

Test Conditions

Sample Volume (delivered to the HM reaction vessel)	12 µL
Biotinylated Antibody Reagent Volume	20 µL
Chemibeads Reagent Volume	10 µL
Streptavidin Sensibeads Reagent Volume	12 µL
Temperature	37.0 °C
Reaction Time	16 minutes
Wavelength	Illumination 680 nm, Emission 612 nm
Type of Measurement	Chemiluminescence

Calibration

Assay Range	0.007 – 100 µIU/mL [mIU/L][d]
Calibration Material	LOCI Thyroid Calibrator, Cat. No. RC610/RC610A
Calibration Scheme	5 levels, n = 3
Units	µIU/mL [mIU/L] (µIU/mL x 1)=[mIU/L]
Typical Calibration Levels	Level 2: 0.0 µIU/mL [mIU/L] Level 3: 4.0 µIU/mL [mIU/L] Level 4: 20 µIU/mL [mIU/L]

Level 5: 50 µIU/mL [mIU/L]
Level 6: 105 µIU/mL [mIU/L]

Calibration Frequency: Every new reagent cartridge lot
Every 30 days for any one lot
For each new lot of Flex reagent cartridges
As indicated in laboratory quality control procedures
After major maintenance or service, if indicated by quality control results

d. Système International d'Unités [SI units] are in brackets.

Backup Process:
Refer to Brown Clinic Back-up Policy

INTERPRETATION:

The instrument calculates the concentration of TSH in µIU/mL [mIU/L] using the calculation scheme described in your Dimension® EXL™ with LM Operator's Guide.

Results of this test should always be interpreted in conjunction with the patient's medical history, clinical presentation and other findings.

LIMITATIONS:

Analytical Measurement Range (AMR): 0.007 – 100 µIU/mL [mIU/L]

This is the range of analyte values that can be measured directly from the specimen without any dilution or pretreatment that is not part of the usual analytical process and is equivalent to the assay range.

- Samples with results in excess of 100 µIU/mL [mIU/L] will be sent out for additional testing.
- Samples with results less than 0.007 µIU/mL [mIU/L] should be reported as "less than 0.007 µIU/mL [mIU/L]".

Limitations of Procedure

Patient samples may contain heterophilic antibodies that could react in immunoassays to give falsely elevated or depressed results. This assay has been designed to minimize interference from heterophilic antibodies. Nevertheless, complete elimination of this interference from all patient specimens cannot be guaranteed. A test result that is inconsistent with the clinical picture and patient history should be interpreted with caution.[10,11]

Performance of this assay has not been established with neonatal specimens.

The instrument reporting system contains flags and comments to provide the user with information regarding instrument processing errors, instrument status information and potential errors in TSHL results. Refer to your Dimension® EXL™ with LM Operator's Guide for the meaning of report flags and comments. Any report containing flags and/or comments should be addressed according to your laboratory's procedure manual and not reported.

Expected Values: 0.358 – 3.74 µIU/mL [mIU/L]

The reference interval was transferred from that previously determined for the TSH method on the Dimension Vista® System. It represents the central 95% of results determined non-parametrically from a population of 297 apparently healthy adults (187 males and 110 females, 18 – 65 years of age). The original determination and transference to the TSHL method was done in accordance with CLSI/NCCLS

C28-A2.[12] Each laboratory should establish its own expected values for TSH as performed on the Dimension® EXL™ with LM system.

Analytical Specificity

For Known Interfering Substances section refer to package insert.

For Known Non-Interfering Substance refer to package insert.

For Additional Technical Information refer to package insert.

Reference: TSHL Flex® reagent cartridge insert sheet PN 741612.001 Issue Date 2015-02-18

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Date of Implementation: 9-1-12
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Written By: ____Lori Murray MT(ASCP)_____ Date: _8-11-12_____

Approved By: _____Aaron Shives, MD_____ Date: ___10/21/2017_____
Laboratory Director

REVIEW - REVISION SUMMARY DOCUMENTATION

Date	By	Revision Summary
6/1/15	Heather Hall	Updated sample diluent, changed testing steps for samples in excess of AMR
12-8-15	Sam Legg	Updated Risk and Safety per package insert dated 02-18-2015
10/18/17	Heather Hall	Modified Backup Process