Thyroid Stimulating Hormone (3rd IS) – Serum Technical Procedure 3231
Beckman UniCel DxI Systems

Principle

Intended Use

The Access TSH (3rd IS) assay is a paramagnetic particle, chemiluminescent immunoassay for the quantitative determination of human thyroid-stimulating hormone (thyrotropin, TSH, hTSH) levels in human serum and plasma using the Access Immunoassay Systems. This assay is capable of providing 3rd generation TSH results.

Clinical Significance

Human thyroid-stimulating hormone is a glycoprotein hormone consisting of two noncovalently bound subunits: an α subunit, which is nearly identical to the α subunits of human luteinizing hormone (hLH), human follicle-stimulating hormone (hFSH), and human chorionic gonadotropin (hCG), and a β subunit, which is responsible for immunological and biological specificity.[1] TSH, released from the anterior pituitary, is the principal regulator of thyroid function, stimulating the synthesis and release of thyroid hormones thyroxine (T4) and triiodothyronine (T3). T3 and T4 regulate biochemical processes that are essential for normal metabolism. The synthesis and secretion of TSH is stimulated by thyrotropin-releasing hormone (TRH), which is produced by the hypothalamus in response to low levels of circulating T3 and T4. In contrast, elevated levels of T3 and T4 suppress the production of TSH. Collectively, this negative feedback system is referred to as the hypothalamic-pituitary-thyroid axis. Any alteration in the function of this axis can influence the levels of TSH, T4, and T3 in circulation.[1]

The principal clinical use for TSH measurement is for the assessment of thyroid status. TSH is measured in conjunction with thyroid hormones or antibodies to: 1) detect or exclude hypothyroidism or hyperthyroidism; 2) monitor T4 replacement treatment in hypothyroidism or anti-thyroid treatment in hyperthyroidism; 3) monitor TSH suppression in thyroid cancer patients on thyroxine therapy; and 4) assess the response to TRH stimulation testing.[2,3]

Methodology

The Access TSH (3rd IS) assay is a two-site immunoenzymatic (“sandwich”) assay. A sample is added to a reaction vessel with mouse anti-hTSH-alkaline phosphatase conjugate, buffered protein solution and paramagnetic particles coated with immobilized mouse monoclonal anti-hTSH antibody. The hTSH binds to the immobilized monoclonal anti-hTSH antibody on the solid phase while the mouse anti-hTSH-alkaline phosphatase conjugate reacts with a different antigenic site on the hTSH. After incubation in a reaction vessel, materials bound to the solid phase are held in a magnetic field while unbound materials are washed away. Then, the chemiluminescent substrate Lumi-Phos* 530 is added to the vessel and light generated by the reaction is measured with a luminometer. The light production is directly proportional to the concentration of TSH in the sample. The amount of analyte in the sample is determined from a stored, multi-point calibration curve.

Specimen

Acceptable Sample Containers

13 x 75 SST and Red Top BD tubes
SST and Red Top BD microtainers

Unacceptable Specimens

Whole blood, plasma, or urine are not recommended for use as a sample.

Grossly hemolyzed samples are unacceptable.

Specimen Storage and Stability

Tubes of blood are to be kept closed at all times and in a vertical position. Allow serum samples to clot in an upright position before centrifugation. It is recommended that the serum be physically separated from contact with cells within two hours from the time of collection.

Separated serum should not remain at room temperature longer than 18 hours. If assays are not completed within 18 hours, serum should be stored at 2°C to 10°C. If assays are not completed within 7 days, or the separated sample is to be shipped, samples should be frozen at -20°C or colder. Frozen samples can be stored up to 90 days at -20°C before testing.

Frozen samples should be thawed only once. Mix gently by inversion, and centrifuge after thawing prior to sample analysis.

Ensure residual fibrin, cellular matter, and bubbles have been removed prior to analysis. Aliquoted samples must be centrifuged at 2200 RCF for 1 minute prior to analysis.

Sample Volume

Optimum volume: 0.5 mL, Minimum volume: 0.3 mL

Use 55 uL of sample for each determination in addition to the sample container and system dead volumes when requesting the TSH3 assay. Use 50 uL of sample in addition to the sample container and system dead volumes for each determination run with the DxI system onboard dilution feature (test name:TSH3d).

Reagents

Access TSH3 (3rd IS) Reagent Pack

Catalog No. B63284: 400 determinations, 2 packs, 100 tests/pack

Provided ready to use.

Store upright and refrigerate at 2°C to 10°C.

Reagent packs must have been stored at 2°C to 10°C for a minimum of two hours before use on the instrument.

Stable until the expiration date stated on the label when stored at 2°C to 10°C.

Stable at 2°C to 10°C for 28 days after initial use.

Signs of possible deterioration are a broken elastomeric layer on the pack or control values out of range.

If the reagent pack is damaged (i.e., broken elastomer), discard the pack.

Reagent Pack Contents

R1a	Paramagnetic particles coated with mouse monoclonal anti-human TSH antibody suspended in TRIS buffered saline, with surfactant, bovine serum albumin (BSA), < 0.1% sodium azide, and 0.1% ProClin** 300.
R1b	TRIS buffered saline with surfactant, BSA, protein (murine), < 0.1% sodium azide, and 0.1% ProClin** 300.
R1c	Mouse monoclonal anti-human TSH alkaline phosphatase conjugate in ACES buffered saline, with surfactant, BSA matrix, protein (murine), < 0.1% sodium azide, and 0.25% ProClin** 300.
R1d	Mouse monoclonal anti-human TSH alkaline phosphatase conjugate in ACES buffered saline, with surfactant, BSA matrix, protein (murine), < 0.1% sodium azide, and 0.25% ProClin** 300.

**ProClin is a trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow.

Reagent Pack Preparation

Gently mix reagent pack to remove any paramagnetic particles clinging to the elastomeric top. It is not necessary to completely resuspend the paramagnetic particles from the bottom of the pack. Do not mix open (punctured) packs.

DO NOT MIX TSH3 REAGENT PACKS USING A VORTEX MIXER.

Access Substrate

Catalog No. 81906: 4 x 130 mL

Provided ready to use. Refer to the following chart for storage conditions and stability. An increase in substrate background measurements may indicate instability.

Condition	Storage	Stability
Unopened	2°C to 8°C	Until expiration date stated on the label
Equilibration prior to use (unopened)	15°C to 30°C (room temperature)	Minimum 18 hours, Maximum 14 days
In use (opened)	Internal substrate supply position	Maximum 14 days

Lumi-Phos* 530 (buffered solution containing dioxetane Lumigen* PPD, fluorescer, and surfactant). Substrate is sensitive to air exposure. Keep tightly closed at all times. Do not pool bottles of substrate.

*Lumi-Phos and Lumigen are trademarks of Lumigen, Inc.

Access Wash Buffer II

Catalog No. A16793: 1 x 10 L

Provided ready to use. Stable until the expiration date stated on the label when stored at room temperature (15°C to 30°C). An increase in substrate background measurements or increased relative light units for the zero calibrators in “sandwich”-type assays may indicate instability.

R3 Wash Buffer II: TRIS buffered saline, surfactant, < 0.1% sodium azide, and 0.1% ProClin** 300.

Access Wash Buffer II Diluent Pack

Catalog No. A79784: 2 diluent packs, 32.9 mL/pack

Provided ready to use.

Store upright and refrigerate at 2 to 10°C. Stable until the expiration date stated on the label when stored refrigerated.

Stable at 2 to 10°C after initial use of each well.

Signs of possible deterioration are a broken elastomeric layer on the pack. If the diluent pack is damaged (i.e., broken elastomer), discard the pack.

R1a – R1e	TRIS buffered saline, surfactant, < 0.1% sodium azide, and 0.1% ProClin 300

Reagent Warnings and Precautions

Patient samples and blood-derived products may be routinely processed with minimum risk using the procedure described. However, handle these products as potentially infectious according to universal precautions and good clinical laboratory practices, regardless of their origin, treatment, or prior certification. Use an appropriate disinfectant for decontamination. Store and dispose of these materials and their containers in accordance with local regulations and guidelines.

The antigen used in the preparation of the reagent is derived from human pituitary extracts. Handle these products as potentially infectious according to universal precautions and good clinical laboratory practices,

regardless of their origin, treatment, or prior certification. Use an appropriate disinfectant for decontamination. Store and dispose of these materials and their containers in accordance with local regulations and guidelines. [2]

Sodium azide may react with lead and copper plumbing to form highly explosive metal azides. On disposal of liquids, flush with a large volume of water to prevent azide build-up.(9)

ProClin 300 is a potential skin sensitizer. Avoid spilling or splashing this reagent on skin or clothing. In case of contact with the reagent, flush thoroughly with soap and water.

R 43: May cause sensitization by skin contact.

S 28-37: After contact with skin, wash immediately with plenty of soap and water. Wear suitable gloves.

Safety Data Sheets (SDS) are available online.

Equipment

This test is performed on the Beckman UniCel DxI800 systems; Beckman-Coulter, Brea, California. For technical assistance, call the Beckman-Coulter hotline: 1-800-854-3633.

Refer to the Beckman UniCel DxI systems *Instructions for Use* manual, *Reference Manual* and/or *Help System* for detailed instructions.

Calibration

An active calibration curve is required. For the Access TSH3 (3rd IS) assay, calibration is required every 28 days. Refer to the UniCel DxI System *Instructions for Use* manual and/or *Help System* for information on calibration theory, configuring calibrators, calibrator test request entry, and reviewing calibration data.

Calibrator Required

Catalog No. B11754: S0–S5, 4.0 mL/vial

Refer to calibration card for exact concentrations.

Calibrator S0	Buffered bovine serum albumin (BSA) matrix with surfactant, < 0.1% sodium azide, and 0.5% ProClin 300. Contains 0.0 uIU/mL hTSH.
Calibrators S1, S2, S3, S4, S5	Approximately 0.050, 0.30, 15.0, and 50.0 uIU/mL hTSH, respectively, in buffered BSA matrix with surfactant, < 0.1% sodium azide, and 0.5% ProClin 300.
Calibration Card	1

**ProClin is a trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow.

Calibrator Preparation

S0–S5 calibrators are provided ready to use.

Calibrator Storage and Stability

Calibrators should be refrigerated upon receipt. Store calibrators upright at 2 - 10°C.

Calibrators are provided ready to use. Mix contents by gently inverting prior to use. Avoid bubble formation.

Return calibrators to 2 - 10°C after each use.

Calibrators are stable for 90 days after open date.

Signs of possible deterioration are control values out of range. Discard vials if there is evidence of microbial

contamination or excessive turbidity in the calibrators.

Calibration Information

The Access TSH (3rd IS) Calibrators are provided at six levels – zero, and approximately 0.050, 0.30, 3.0, 15.0, and 50.0 uIU/mL. Assay calibration data are valid up to 28 days.

Calibrators are run in duplicate.

Quantitative assay calibration is the process by which samples with known analyte concentrations (i.e., assay calibrators) are tested like patient samples to measure the response. The mathematical relationship between the measured responses and the known analyte concentrations establishes the calibration curve. This mathematical relationship, or calibration curve, is used to convert RLU (Relative Light Unit) measurements of patient samples to specific quantitative analyte concentrations.

Traceability

The analyte in the Access TSH (3rd IS) Calibrators is traceable to the WHO 3rd International Standard 81/565. Traceability process is based on EN ISO 17511. [1]

The assigned values were established using representative samples from this lot of calibrator and are specific to the assay methodologies of the Access reagents. Values assigned by other methodologies may be different. Such differences, if present, may be caused by inter-method bias.

Quality Control

Three levels of control material will be analyzed each day of patient testing.

In addition, controls should be run under the following circumstances:

Upon loading a new reagent cartridge.
Following each new calibration.
Following specific maintenance or troubleshooting procedures as detailed in the UniCel DxI800 System *Instructions For Use* manual.

More frequent use of controls or the use of additional controls is left to the discretion of the user based on workload and workflow.

The following controls should be used in accordance with the package instructions for use inserts. Quality control results should be evaluated and handled with respect to the Clinical Chemistry Quality Control Procedure #3000.T. Controls are compiled statistically in the LIS and reagent lot changes are documented on DxI Reagent Log sheets.

Control	Storage UNOPENED	Storage THAWED/OPENED
BioRad Liquichek Immunoassay Plus Level 1	-20° to -70°C	2° to 8°C
BioRad Liquichek Immunoassay Plus Level 2	-20° to -70°C	2° to 8°C
BioRad Liquichek Immunoassay Plus Level 3	-20° to -70°C	2° to 8°C

Bio Rad Immunoassay Plus controls are received frozen and are stable until their expiration date when stored at –20°C to –70°C.

To thaw the controls, allow vials to stand at room temperature (18°C to 25°C) until it is completely thawed., then store at 2°C to 8°C. For optimal analyte stability in the thawed state, promptly return vials to 2°C to 8°C storage after each use. Once thawed, do not refreeze the product.

Thawed, opened controls stored at 2°C to 8°C are good for 5 days. Before each use, allow controls to reach room temperature (18°C to 25°C) before use. Gently swirl contents to ensure homogeneity. After each use promptly replace the stopper and return to 2°C to 8°C storage.

Testing Procedure

Refer to the UniCel DxI *Instructions for Use* manual and/or *Help System* for information on managing samples, configuring tests, requesting tests, and reviewing test results.

1. If necessary, load the reagent onto the system. Mix contents of new (unpunctured) reagent as described in Reagent Preparation before loading on the instrument. Do not invert open (punctured) packs. Refer to the Beckman UniCel DxI systems *Instructions for Use* manual and/or *Help System* for detailed instructions. Date, initial cartridge and document in reagent log before loading each new cartridge.
2. After reagent load is completed, calibration may be required. Refer to the Beckman UniCel DxI systems *Instructions for Use* manual and/or *Help System* for detailed instructions.
3. Program samples and controls for analysis. Refer to the Beckman UniCel DxI systems *Instructions for Use* manual and/or *Help System* for detailed instructions.
4. Use fifty-five (55) µL of sample for each determination in addition to the sample container and system dead volumes when requesting the assay (test name: TSH3). Use fifty (50) µL of sample in addition to the sample container and system dead volumes for each determination run with the special dilution feature (test name: TSH3d). Refer to the appropriate system manuals and/or Help system for the minimum sample volume required.
5. After loading samples and controls onto the system, follow the protocols for system operation. Refer to the Beckman UniCel DxI systems *Instructions for Use* manual and/or *Help System* for detailed instructions.

Reporting Results

Patient test results are determined automatically by the system software. The amount of analyte in the sample is determined from the measured light production by means of the stored calibration data. Patient test results can be reviewed using the appropriate screen. Refer to the UniCel DxI *Instructions for Use* manual and/or *Help System* for complete instructions on reviewing sample results.

Expected Values

Beckman Coulter conducted a multicenter prospective study across geographically diverse locations to establish the central 97.5% reference interval in apparently healthy, euthyroid adults. Subjects with no known personal or family thyroid disease, goiter, chronic disease (including cancer, diabetes, autoimmune disease, or cardiovascular disease), acute bacterial or viral infection, or current use of prescription medication (excluding prenatal vitamins) or aspirin were enrolled in the study, following the guidance of both the National Academy of Clinical Biochemistry's (NACB) Laboratory Medicine Practice Guideline, Laboratory Support for the Diagnosis and Monitoring of Thyroid Disease, and the Third National Health and Nutrition Examination Survey (NHANES III). [3,11]

The study included four populations: a general population of approximately equal numbers of males and non-pregnant females between the ages of 21-88; and pregnant females with approximately equal distribution across all three trimesters. Trimesters were defined according to American Congress of Obstetricians and Gynecologists guidelines.[12] Approximately four hundred (400) subjects were enrolled in each population.

After enrollment, subjects' samples were screened for positive thyroid peroxidase antibody (TPOAb) and thyroglobulin antibody (TgAb) using the Beckman Coulter Access TPO Antibody and Access Thyroglobulin Antibody II assays prior to analyses. Samples with positive TPOAb or TgAb results (approximately 10%) were excluded from analysis of the TSH reference intervals.

Serum samples were analyzed using multiple UniCel DxI 800 Access Immunoassay Systems with the Access TSH (3rd IS) assay, following the CLSI EP28-A3c guideline.[13] The observed non-parametric ranges of TSH concentrations are shown below for each population tested.

Population	n	Median (uIU/mL)	97.55% Reference Interval (uIU/mL)
General Population (males and non-pregnant females, aged 21-88)	367	1.48	0.45 – 5.33
Pregnant Females, 1st Trimester	318	1.13	0.05 – 3.70
Pregnant Females, 2nd Trimester	362	1.47	0.31 – 4.35
Pregnant Females, 3rd Trimester	335	1.61	0.41 – 5.18

***Post-menopausal status confirmed using circulating FSH and estradiol levels.

For additional reference interval guidance, refer to the National Academy of Clinical Biochemistry (NACB) publication, Laboratory Support for the Diagnosis and Monitoring of Thyroid Disease, and the Third National Health and Nutrition Examination Survey (NHANES III).[3,11]

The evaluation of thyroid status should not depend on results from a single test. Complete thyroid status evaluation should include other thyroid function tests, including evaluation of thyroid autoantibodies (useful in the diagnosis of autoimmune thyroiditis), and the physician's clinical evaluation.

UCDH

Reference interval from a normal study determined at UCDMC by the Access HYPERsensitive hTSH assay: 0.35 - 3.30 uIU/mL

Reported Reference Intervals using the Access HYPERsensitive hTSH assay:

TSH Range for Adults (>18 yr)

Clinical Condition	uIU/mL
Euthyroid	0.35 – 3.30
Hyperthyroid	less than 0.35
Hypothyroid	greater than 5.60

Pediatric TSH Reference Intervals

Age	Gender	Interval (uIU/mL)
1 day to 1 month	male	0.70 – 9.80
1 day to 1 month	female	1.50 – 6.50
1 month to 2 years	male	0.70 – 5.90
1 month to 2 years	female	1.00 – 5.70
2 years to 18 years	male/female	0.60 – 4.40

Pediatric reference intervals were obtained from laboratories using the same test methodology. No in-house studies were performed. This information should serve as a general guideline

Procedural Notes

Limitations/Interferences

For assays employing antibodies, the possibility exists for interference by heterophile antibodies in the patient sample. Patients who have been regularly exposed to animals or have received immunotherapy or diagnostic procedures utilizing immunoglobulins or immunoglobulin fragments may produce human anti-animal antibodies, e.g. HAMA, that interfere with immunoassays. [14,15] Such interfering antibodies may cause erroneous results. Carefully evaluate the results of patients suspected of having these antibodies.

Other potential interferences in the patient sample could be present and may cause erroneous results in immunoassays. Some examples that have been documented in literature include rheumatoid factor, endogenous alkaline phosphatase, fibrin, and proteins capable of binding to alkaline phosphatase.[16] Carefully evaluate the results of patients suspected of having these types of interferences.

The Access TSH (3rd IS) assay does not demonstrate any “hook” effect up to 1,000 uIU/mL.

The assay is not validated for testing neonatal serum hTSH levels.

Serum samples containing hTSH concentrations of approximately 0.30 µIU/mL and 5.0 µIU/mL were spiked with multiple concentrations of the substances below and run on one UniCel DxI 800 Immunoassay System. Values were calculated as described in CLSI EP7-A2.20 Interference was determined by testing controls (no interfering substance added) and matched test samples (with interfering substance added). Of the compounds tested, none were found to cause significant interference (as defined by a shift in dose greater than 10%) using the highest test concentrations indicated in the table below.

Substance	Highest Concentration Added
Acetaminophen	200 ug/mL
Acetylsalicylic Acid	650 ug/mL
Bilirubin (conjugated)	45 mg/dL
Bilirubin (unconjugated)	40 mg/dL
Hemoglobin	1000 mg/dL
Heparin (Sodium)	3 U/mL
hGH (Human Growth Hormone)	134 ng/mL
Human Serum Albumin (HSA)	6000 mg/dL
Ibuprofen	500 ug/mL
Multi-vitamin (Centrum Liquid)	0.9% (v/v)
Triglycerides (Intra Lipid)	3300 mg/dL

Analytical Specificity

A study was performed to evaluate the potential cross-reactivity of the assay with other substances that are similar in structure to hTSH. Serum samples containing hTSH concentrations of approximately 0.30 uIU/mL and 5.0 uIU/mL were spiked with multiple concentrations of the substances below and run on one UniCel DxI 800 Immunoassay System. Values were calculated as described in CLSI EP7-A2. [20]

Samples containing substances at the concentrations listed below do not affect the concentration of hTSH reported.

Substance	Highest Concentration Added (mIU/mL)	Cross-reactivity (%)
hCG	1,000,000	< 0.010 %
hFSH	1,000	< 0.010 %
hLH	3,000	< 0.010 %

Performance Characteristics

Analytical Measurement Range

Samples can be accurately measured within the analytic range of the lower Limit of Quantitation (LoQ) and the highest calibrator value (S5) (approximately 0.01 – 50.00 uIU/mL)

Clinical Reportable Range:

If a sample contains less than the lower Limit of Quantitation (LoQ) for the assay, report the results as **< 0.02 uIU/mL**.

Samples containing greater than the concentration of the Access TSH (3rd IS) S5 calibrator for the TSH3 assay will reflex the dilution assay, **TSH3d**, to extend the analytical measurable range from 37.50 – 500.00 uIU/mL. If the TSH3d result is greater than 500.00 uIU/mL, the TSH result is reported as **> 500.00 uIU/mL**.

Short samples QNS for dilution will be reported as **>50.00 uIU/mL, QNS for dilution**.

DxI Onboard Dilution:

Samples containing hTSH concentrations greater than the concentration of the Access TSH (3rd IS) S5 calibrator can be processed using the DxI onboard dilution feature. The DxI system onboard dilution feature automates the dilution process, using one volume of sample with 199 volumes of Wash Buffer II from the Diluent pack allowing samples to be quantitated from 37.50 uIU/mL up to approximately 50.00 uIU/mL.

The system reports the results adjusted for the dilution. Any neat sample reading < 37.50 uIU/mL from the TSH3d assay should be retested in the TSH3 assay.

Samples with sufficient volume requiring a dilution that's been loaded on the automation line will automatically have a reserve volume aspirated for TSH3d testing if required. No further action is required.

Samples that are front loaded should be placed in the flexible volume rack. Samples with sufficient volume requiring a dilution, but front loaded using the non-flexible volume rack, must be reloaded for the on-board dilution.

For short samples with insufficient volume for dilution, use the regular 0.5 mL cup rack without flexible volume. Short samples QNS for dilution will be reported as > 50.00 uIU/mL, QNS for dilution.

Do not reuse small sample volumes that have been resident on the analyzer for more than 1 hour.

Limit of Blank

The Access TSH (3rd IS) assay is designed to have a Limit of Blank (LoB) of < 0.005 uIU/mL. In one study, LoB was tested using a protocol based on CLSI EP17-A2.21 A total of 360 replicates of four zero analyte samples were measured in three runs using multiple reagent pack lots and one calibrator lot on multiple UniCel DxI 800 Immunoassay Systems. This study determined the LoB for the Access TSH (3rd IS) assay to be 0.0004 uIU/mL, which supports the claim of < 0.005 uIU/mL.

Limit of Detection

The Access TSH (3rd IS) assay is designed to have a Limit of Detection (LoD) of ≤ 0.005 uIU/mL. In one study, LoD was tested using a protocol based on CLSI EP17-A2.21 A total of 675 replicates from five low-level samples were measured using multiple reagent pack lots and one calibrator lot in five runs on multiple UniCel DxI 800 Immunoassay Systems. This study determined the LoD for the Access TSH (3rd IS) assay to be 0.001 uIU/mL, which supports the claim of ≤ 0.005 uIU/mL.

Limit of Quantitation

The Access TSH (3rd IS) assay is designed to have a Limit of Quantitation (LoQ) of ≤ 0.01 uIU/mL at ≤ 10% between-run CV. In one study, LoQ was tested using a protocol based on CLSI EP17-A2.21 A total of 945 replicates of seven samples were measured using multiple reagent pack lots and one calibrator lot in five runs on one UniCel DxI 800 Immunoassay System. LoQ was determined as the lowest concentration with a between-run imprecision of 10% CV. This study determined the LoQ for the Access TSH (3rd IS) assay to be 0.001 uIU/mL, which supports the claim of ≤ 0.01 uIU/mL at ≤ 10% between-run CV.

Dilution Recovery

Four serum samples at concentrations above the Access TSH (3rd IS) S5 calibrator (approximately 50.00 uIU/mL) were diluted 1/10 with Wash Buffer II. Twenty-four replicates for each sample were measured on one UniCel DxI 800 Immunoassay System, providing the following data:

Sample	Target Concentration (uIU/mL	TSH (3rd IS) Sample Mean Recovery (%)	Manual Dilution Sample Mean Recovery (%)
Sample 1	100	97	114
Sample 2	200	98	112
Sample 3	300	93	100
Sample 4	400	93	100

Equivalency/Methods Comparison

As determined by Beckman

A comparison of 2155 serum values using the Access TSH (3rd IS) assay on the UniCel DxI800 Immunoassay System and a commercially available immunoassay kit yielded the following statistical data using Passing-Bablok regression and Pearson's correlation, following the CLSI EP9-A3 guideline.[17]

n	Range of Observations* (uIU/mL)	Intercept (uIU/mL) [95% CI]	Slope [95% CL]	Correlation Coefficient (r)
155	30.056 – 42.50	-0.02 [-0.05 – 0.00]	0.94 [0.92 – 0.97]	0.98

*Observed concentration range of the Access TSH (3rd IS) assay.

As determined byUCDMC

DxI-602049
Serum (in the range of 0.00 – 50.00 uIU/mL)

Y (TSH 3rd IS)	= 0.9448X + 0.4002
N	= 42
Mean (TSH 3rd IS)	= 6.71
Mean (hTSH)	= 6.88
Correlation Coefficient (r)	= 0.9914

DxI-602053
Serum (in the range of 0.00 – 46.52 uIU/mL)

Y (TSH 3rd IS)	= 0.9013X + 0.4983
N	= 42
Mean (TSH 3rd IS)	= 6.42
Mean (hTSH)	= 6.57
Correlation Coefficient (r)	= 0.9890

TSH 3rd IS
Serum (in the range of 0.00 – 50.00 uIU/mL)

Y (DxI800-602053)	= 0.9333X + 0.1610
N	= 42
Mean (DxI800-602053)	=6.42
Mean (DxI800-602049)	= 6.71
Correlation Coefficient (r)	= 0.9980

Precision

The Access TSH (3rd IS) assay exhibits total imprecision ≤ 10.0% CV at concentrations > 0.02 uIU/mL, and total Standard Deviation (SD) ≤ 0.0029 uIU/mL at concentrations ≤ 0.02 uIU/mL.

One study, using four serum-based samples on one UniCel DxI 800 Immunoassay System, generating a total of 40 assays, two replicates per assay, over 20 days with two runs per day, provided the following data, calculated based on the CLSI EP5-A3[19] guideline.

		Within-Run		Between-Day		Between-Run		Total Imprecision (Within-Laboratory Precision)	
Sample	**Grand Mean uIU/mL (n=80)**	**SD uIU/mL**	**% CV**	**SD uIU/mL**	**% CV**	**SD uIU/mL**	**% CV**	**SD uIU/mL**	**% CV**
Sample 1	0.02	0.0004	1.8	0.0008	3.7	0.0004	1.6	0.0010	4.4
Sample 2	0.37	0.006	1.5	0.010	2.7	0.006	1.5	0.013	3.5
Sample 3	4.71	0.13	2.7	0.11	2.4	0.008	0.2	0.17	3.6
Sample 4	38.76	1.36	3.5	1.80	4.6	0.48	1.3	2.31	5.9

Precision established at UCDMC

Analyzer	Type of Precision	Sample Type	n	Mean uIU/mL	1 SD	%CV
DxI800-602049	Within-run	BioRad Immunoassay Plus Level 1	20	0.63	0.014	2.22
		BioRad Immunoassay Plus Level 2	20	5.73	0.243	4.24
		BioRad Immunoassay Plus Level 3	20	29.22	1.221	4.18
	Between-run	BioRad Immunoassay Plus Level 1	20	0.64	0.033	5.16
		BioRad Immunoassay Plus Level 2	20	5.95	0.226	3.80
		BioRad Immunoassay Plus Level 3	20	29.00	1.297	4.47
DxI800-602053	Within-run	BioRad Immunoassay Plus Level 1	20	0.60	0.016	2.67
		BioRad Immunoassay Plus Level 2	20	5.37	0.145	2.70
		BioRad Immunoassay Plus Level 3	20	27.14	1.021	3.76
	Between-run	BioRad Immunoassay Plus Level 1	22	0.61	0.018	2.95
		BioRad Immunoassay Plus Level 2	22	5.45	0.186	3.41
		BioRad Immunoassay Plus Level 3	22	27.24	0.977	3.59

Additional Information

For more detailed information on UniCel DxC Systems, refer to the *Instructions for Use* and *Reference* manual.

References

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New	Replaces hTSH methodology change	kdagang		