Digoxin (Dig) - Serum
Beckman UniCel DXI Systems

Technical Procedure 3209T

Prepared By	Date Adopted	Supersedes Procedure #
Michael Inn	March, 2003	Previous procedure #3825A

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For In Vitro Diagnostic Use Only

Principle

Intended Use

The Access Digoxin assay is a paramagnetic particle, chemiluminescent immunoassay for the quantitative determination of digoxin levels in human serum using the Beckman UniCel DxI Immunoassay Systems.

Summary and Explanation

Digoxin is a potent, cardiac glycoside isolated from the leaves of Digitalis lanta. This glycoside is a widely prescribed drug used in the treatment of congestive heart failure, atrial fibrillation, atrial flutter, supraventricular tachycardia, and other cardiac disorders. Treatment with digoxin results in more effective cardiac contractility, decrease in conduction velocity, and a slowing of the heart rate.(1,2,3)

The therapeutic range for digoxin is narrow. Desired effects become exaggerated with administration of an excess of digoxin leading to conditions difficult to distinguish from the original cardiac symptoms. Coupled with the narrow therapeutic to toxic range is a considerable variability in patient response to the same dose. In different patients identical doses of digoxin result in different serum levels mainly due to individual variation in myocardial sensitivity, absorption, diet, and excretion of the drug. The variability in bioavailability of different drug formulations and interactions with other drugs, particularly drugs affecting the electrolyte balance such as diuretics, also affect individual patient responses. Measuring a serum sample drawn 6–8 hours after the administration of digoxin allows for equilibration of serum and tissue digoxin levels. Monitoring digoxin levels can assist the physician in adjusting digoxin dosage.(1,2,3)

Methodology

The Access Digoxin assay is a competitive binding immunoenzymatic assay. A sample is added to the reaction vessel with anti-digoxin antibody, digoxin-alkaline phosphatase conjugate, and paramagnetic particles coated with goat anti-rabbit capture antibody. Digoxin in the sample competes with the digoxin-alkaline phosphatase conjugate for binding sites on a limited amount of specific anti-digoxin antibody. Resulting antigen: antibody complexes bind to the capture antibody on the solid-phase. 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 inversely proportional to the concentration of digoxin in the sample. The amount of analyte in the sample is determined from a stored, multi-point calibration curve.

Acceptable Sample Containers

13 x 75 SST and Red Top BD tubes
SST and Red Top BD microtainers
Optimum volume: 0.5 mL, Minimum volume: 0.25 mL

Specimen Collection and Preparation

Type of Sample

1. Serum is the recommended sample. To obtain steady-state serum digoxin concentrations, blood samples should be drawn 6–8 hours after the daily dose or just prior to the next scheduled dose.
   Whole blood or urine, PST and plasma samples are not recommended for use as a sample.
2. Observe the following recommendations for handling, processing, and storing blood samples:(5)
   - Collect all blood samples observing routine precautions for venipuncture.
   - Allow serum samples to clot completely before centrifugation.
   - Keep tubes stoppered at all times.

- Within two hours after centrifugation, transfer at least 500 µL of cell-free sample to a storage tube. Tightly stopper the tube immediately.
- Store samples tightly stoppered at room temperature (15°C to 30°C) for no longer than eight hours.
- If the assay will not be completed within eight hours, refrigerate the samples at 2°C to 8°C.
- If the assay will not be completed within 48 hours, or for shipment of samples, freeze at -20°C or colder.
- Thaw samples only once. Do not thaw in water bath. Mix gently by inversion and centrifuge after thawing prior to sample analysis.

3. Use the following guidelines when preparing specimens:
   - Ensure residual fibrin and cellular matter has been removed prior to analysis.
   - Use laboratory posted settings for sample centrifugation of sample tubes.

Reagents

Access Digoxin Reagent Pack

Cat. No. 33710: 100 determinations, 2 packs, 50 tests/pack

- Provided ready to use.
- Store upright and refrigerate at 2°C to 10°C.
- Refrigerate 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 14 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.
- All antisera are polyclonal unless otherwise indicated.

R1a	Paramagnetic particles coated with goat anti-rabbit IgG suspended in TRIS buffered saline, with surfactant, bovine serum albumin (BSA) matrix, < 0.1% sodium azide, and 0.0125% Cosmocil** CQ.
R1b	Digoxin-alkaline phosphatase (bovine) conjugate in TRIS buffered saline, with surfactant, BSA matrix, < 0.1% sodium azide, and 0.0125% Cosmocil CQ.
R1c	Rabbit antibody to digoxin in TRIS buffered saline, with surfactant, BSA matrix, rabbit IgG, < 0.1% sodium azide, and 0.0125% Cosmocil** CQ.

Warnings and precautions

1. 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.
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.(4)
3. The Safety Data Sheet (SDS) is available online.

Access Digoxin Calibrators

Catalog Reorder No. 33715: S0–S5, 4 mL/vial

- Provided ready to use.
- Store upright and refrigerate at 2°C to 10°C.
- Mix contents by gently inverting before use. Avoid bubble formation.
- Stable until the expiration date stated on the label when stored at 2°C to 10°C.
- Signs of possible deterioration are control values out of range. Discard the vials if there is evidence of microbial contamination or excessive turbidity in the calibrators.
- Refer to calibration card for exact concentrations..

S0	Human serum, < 0.1% sodium azide, and 0.025% Cosmocil** CQ. Contains 0.0 ng/mL (nmol/L) digoxin.
S1, S2, S3, S4, S5:	Digoxin in human serum at levels of approximately 0.5, 1.0, 2.0, 4.0 and 6.0 ng/mL (0.6, 1.3, 2.6, 5.1 and 7.7 nmol/L), respectively, with < 0.1% sodium azide, and 0.025% Cosmocil** CQ.
Calibration Card:	1

The Access Digoxin Calibrators are intended to calibrate the Access Digoxin assay for the quantitative determination of digoxin levels in human serum using the Beckman Coulter Immunoassay Systems (UniCel DxI800).

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.

Calibrators are run in duplicate.

Traceability

The measurand (DIG) in the Access Digoxin Calibrators is traceable to the USP Digoxin reference material. Traceability process is based on EN ISO 17511..

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.

Warnings and precautions

- Human source material used in the preparation of the reagent has been tested and found negative or non-reactive for Hepatitis B, Hepatitis C (HCV), and Human Immunodeficiency Virus (HIV-1 and HIV-2). Because no known test method can offer complete assurance that infectious agents are absent, handle reagents and patient samples as if capable of transmitting infectious disease.(13)
- Each serum/plasma pool used in the preparation of this product has been tested and found negative for the presence of fibrinogen.
- 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.(4)
- Material Safety Data Sheet (MSDS) is available online.

Access Substrate

Catalog Reorder 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

1. R2 Access Substrate: 4 x 130 mL.
   - Lumi-Phos* 530 (buffered solution containing dioxetane Lumigen* PPD, fluorescer, and surfactant).

Warnings and precautions

- For in vitro diagnostic use.
- Substrate is sensitive to air exposure. Keep tightly closed at all times. Do not pool bottles of substrate.

Access Wash Buffer II

UniCel DxI Wash Buffer II, Cat. 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° 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.

1. R3 Wash Buffer II: 1 x 10 L.
   - TRIS buffered saline, surfactant, < 0.1% sodium azide, and 0.1% ProClin*** 300.

Warnings and precautions

- For in vitro diagnostic use.
- 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.

Access Sample Diluent A Pack

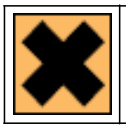
Cat. No. A79783: 2 diluent packs, 32.9 mL/pack

- Provided ready to use. The Access Sample Diluent A is intended for use with Access assays to dilute patient samples containing analyte concentrations greater than the analyte-specific S5 calibrator.
- Store upright and refrigerate at 2°C to 10°C.
- Refrigerate at 2° 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 56 days after initial use of each well.
- Signs of possible deterioration are a broken elastomeric layer on the pack.
- If the reagent pack is damaged (i.e., broken elastomer) or if there is evidence of microbial contamination or excessive turbidity in the diluent, discard the pack.

R1a - R1e	Buffered BSA matrix with surfactant, < 0.1% sodium azide, 0.5% ProClin** 300.

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.
- 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.(11)
- Xi. Irritant: 0.5% ProClin 300



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.

- The*Safety Data Sheet* (SDS) is 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 Myoglobin assay, calibration is required every 28 days. Refer to the UniCel DxI System *Instruction for Use* manual and/or *Help System* for information on calibration theory, configuring calibrators, calibrator test request entry, and reviewing calibration data.

Quality Control

Quality control materials simulate the characteristics of patient samples and are essential for monitoring the system performance of immunochemical assays. Because samples can be processed at any time in a “random access” format rather than a “batch” format, quality control materials should be included in each 24-hour time period.(11)

At least two levels of control material should be analyzed daily. In addition, these controls should be run with each new calibration, with each new reagent lot, and after specific maintenance or troubleshooting procedures as detailed in the UniCel DxI *Instructions for Use* manual. More frequent use of controls or the use of additional controls is left to the discretion of the operator based on work load and work flow.

The following controls should be used in accordance with the package instructions for use inserts. Copies of these inserts can be found in the *Control IFUs* folder on the S drive (*S:\APS\ClinLab\PoliciesandProcedures\1000-8999CLINICALPATHOLOGY\3000-3999Chemistry\3000-3499AutomatedChemistry\ControlIFUs*). 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 the UniCel DxI 800 Reagent Log sheets. Quality control results that do not fall within acceptable ranges may indicate invalid test results. Examine all test results generated since obtaining the last acceptable quality control test point for this analyte. Refer to the UniCel DxI *Instructions for Use* manual and/or *Help System* for information about reviewing quality control results.

Quality Control

Control	Storage
MAS ChemTrak 1	until the expiration date at -20°C or colder /14 days at +2°C to +8°C thawed in use
MAS ChemTrak 3	until the expiration date at -20°C or colder /14 days at +2°C to +8°C thawed in use

Controls are received frozen and stored at –15°C to –20°C.

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. 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. For assaying samples containing Dig concentrations up to the concentration of the Access Dig S5 calibrator (6.0 ng/mL), select **Dig** as the test name.
5. Select **dDig** as the test name for assaying samples containing Dig concentrations greater than 6.0 ng/mL. The same reagent pack is used for both assays.
6. 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.

Procedural Comments

1. Refer to the UniCel DxI *Instructions for Use* manual, *Reference Manual* and/or *Help System* for a specific description of installation, start-up, principles of operation, system performance characteristics, operating instructions, calibration procedures, operational limitations and precautions, hazards, maintenance, and troubleshooting.
2. Mix contents of new (unpunctured) reagent packs by gently inverting pack several times before loading on the instrument. **Do not invert open (punctured) packs**. Document lot number in reagent log, date and initial pack.
3. Use **fifty-five (55) µL** of sample for each determination in addition to the sample container and system dead volumes. Use **one hundred fifty-five (155) µL** 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: **dDig**). Refer to the UniCel DxI *Instructions for Use* manual and/or *Help system* for the minimum sample volume required.
4. The system default unit of measure for sample results is ng/mL. To change sample reporting units to the International System of Units (SI units), nmol/L, refer to the UniCel DxI *Instructions for Use* manual and/or *Help system*. To manually convert concentrations to the International System, multiply ng/mL by multiplication factor 1.281.

Reporting Results

Patient Results

Patient test results are determined automatically by the system software using a weighted four parameter logistic curve (4PLC) math model. 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

1. Considerable intra-individual variations exist in the relationship between digoxin serum concentrations and the dosage administered. In addition, the therapeutic range is narrow and varies from individual to individual. Other factors such as age, general condition, cardiovascular status, and renal function also influence the appropriate therapeutic dose.(2)
2. Steady state therapeutic levels in adults range from 0.8 – 2.0 ng/mL (1.0 – 2.6 nmol/L). Serum digoxin levels greater than 2.0 ng/mL (2.6 nmol/L) usually produce symptoms of toxicity, but not in all individuals.(2)
   UCDMC reference interval is 0.8 to 2.4 ng/mL.
3. Adequate therapeutic levels in children can be achieved with serum digoxin concentrations of 1.1 – 1.7 ng/mL (1.4 – 2.2 nmol/L).(2)

4. Although neonates and infants can tolerate higher digoxin levels, evidence suggests that concentrations greater than 2.0 ng/mL (2.6 nmol/L) produce little, if any, additional therapeutic effects.(2)
5. **CRITICAL VALUE: Digoxin results ≥ 2.5 ng/mL are critical and should immediately be called to the patient's nurse or physician. Sample should always be repeated before reporting.**

Limitations of the Procedure

1. Samples can be accurately measured within the analytic range of the lower limit of detection and the highest calibrator value (approximately 0.20–6.0 ng/mL [0.3–7.7 nmol/L]).
   - If a sample contains less than the functional sensitivity for the assay, report the results as < 0.20 ng/mL.
   - If a sample contains more than the stated value of the highest Access Digoxin Calibrator (S5), the Onboard Dilution Feature will be used with assay test **dDig**.

   Onboard Dilution Feature for use on UniCel DxI

   Samples containing Dig concentrations greater than the concentration of the Access Digoxin 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 1 volume of Access Sample Diluent A from the UniCel DxI Access Immunoassay Systems Sample Diluent A Pack (**Cat. No. A79783**), allowing samples to be quantitated up to approximately 12.0 ng/mL

Test Name	Reportable Range (ng/mL)	Sample Volume Required)
dDig	5.1 to 12.0	155 µL

   Note: The system reports the results adjusted for the dilution. Any neat sample reading < 5.1 ng/mL in the **dDig** assay should be retested in the **Dig** assay.
   - For short samples not enough for dilution, use the regular 0.5 mL cup rack without flexible volume.
   - Samples with sufficient volume requiring a dilution, but front loaded using the non-flexible volume rack, must be reloaded for the on-board dilution.
   - Short samples QNS for dilution will be reported as **>6.0 ng/mL, QNS for dilution**.
   - DO NOT reuse small sample volumes that have been resident on the analyzer for more than 1 hour.
2. For assays employing antibodies, the possibility exists for interference by heterophile antibodies in the patient sample. Patients who have been regularly exposed to animal or have received immunotherapy or diagnostic procedures utilizing immunoglobulins or immunoglobulin fragments may produce antibodies, e.g. HAMA, that interfere with immunoassays. Additionally, other heterophile antibodies such as human anti-goat antibodies may be present in patient samples.(7,8)
   Such interfering antibodies may cause erroneous results. Carefully evaluate the results of patients suspected of having these antibodies.
3. The Access Digoxin results should be interpreted in light of the total clinical presentation of the patient, including: symptoms, clinical history, data from additional tests and other appropriate information.
4. Digoxin metabolites, cardiac glycosides, and some synthetic steroid-like medications can interfere in the assay of digoxin due to cross-reactivity with the digoxin-specific antibody.(9) In addition, Valdes reports that the presence of endogenous digoxin-Like Immunoreactive Factor (DLIF) in some samples may interfere in the assay due to cross-reactivity with the digoxin-specific antibody.(10) Apparently toxic digoxin levels can occur in patients receiving both digoxin and diuretics due to electrolyte imbalances, not assay cross-reactivity.(2)
   See DIGIBIND INTERFERNCE article at the end of this procedure.

Performance Characteristics

Analytical Measurement Range

Samples can be accurately measured within the analytic range of the lower limit of detection and the highest calibrator value (approximately 0.20 ng/mL [0.3 nmol/L] to 6.0 ng/mL [7.7 nmol/L])

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Clinical Reportable Range

- If a sample contains less than the lower limit of detection for the assay, report the results as less than that value [i.e. **< 0.20 ng/mL** (< 0.3 nmol/L)].
- Samples containing more than the stated value of the highest Access Digoxin Calibrator (S5), >6.0 ng/mL, will reflex the dilution assay, dDig, to extend the analytical measurable range from 5.1 to 12.0 ng/mL. If the dDig result is greater than 12.0 ng/mL, the Dig result is reported as **> 12.0 ng/mL**.
- Short samples > 6.0 ng/mL will be reported as **>6.0 ng/mL, QNS for dilution**.

Analytical Sensitivity

The lowest detectable level of digoxin distinguishable from zero (Access Digoxin Calibrator S0) with 95% confidence is 0.20 ng/mL (0.3 nmol/L). This value is determined by processing a complete six point calibration curve, controls, and 10 replicates of the zero calibrator in multiple assays. The analytical sensitivity value is interpolated from the curve at the point that is two standard deviations from the mean measured zero calibrator signal.

Methods Comparison

As determined by Beckman

A comparison of 297 values using the Access Digoxin assay on the Access Immunoassay system and a commercially available immunoassay system gives the following statistical data:

n	Range of Observations (ng/mL)	Intercept	Slope	Correlation Coefficient (r)
297	0.34 - 4.46	0.033	0.998	0.978

As determined by UCDMC

Serum (in the range of 0.20 to 5.38 ng/mL)

Y (DxI800-602049)	= 0.923X - 0.045
N	= 27
MEAN (DxI800-602049)	= 1.859
MEAN (DxI800-600595)	= 2.063
CORRELATION COEFFICIENT (r)	= 0.9956

Serum (in the range of 0.20 to 5.38 ng/mL)

Y (DxI800-602053)	= 1.071X - 0.175
N	= 27
MEAN (DxI800-602053)	= 2.035
MEAN (DxI800-600595)	= 2.063
CORRELATION COEFFICIENT (r)	= 0.9980

Serum (in the range of 0.08 to 4.88 ng/mL)

Y (DxI800-602053)	= 1.160X - 0.122
N	= 27
MEAN (DxI800-602053)	= 2.035
MEAN (DxI800-602049)	= 1.859
CORRELATION COEFFICIENT (r)	= 0.9973

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Dilution Recovery (Linearity)

Multiple dilutions of two samples containing various digoxin levels with Access Digoxin Calibrator S0 (zero) resulted in the following data:

Sample 1	Expected Concentrations (ng/mL)	Determined Concentration (ng/ml)	Recovery (%)
Neat	N/A	1.86	N/A
1/1.4	1.33	1.30	97.7
1/1.8	1.03	1.10	106.8
1/2.3	0.81	0.85	104.9
1/3.5	0.53	0.57	107.5
		Mean % Recovery	**104.2**

Sample 2	Expected Concentrations (ng/mL)	Determined Concentration (ng/ml)	Recovery (%)
Neat	N/A	1.99	N/A
1/1.4	1.42	1.43	100.7
1/1.8	1.11	1.11	100.0
1/2.4	0.83	0.88	106.0
1/3.6	0.55	0.58	105.5
		Mean % Recovery	**103.1**

Spiking Recovery

Addition of four different levels of digoxin to two patient samples with low digoxin resulted in the following data:

Sample 1	Expected Concentrations (ng/mL)	Determined Concentration (ng/ml)	Recovery (%)
Neat	N/A	0.89	N/A
Low	1.42	1.53	1
Medium	1.81	2.03	1
Medium-High	2.52	2.77	109.9
High	3.12	3.30	1
		Mean % Recovery	**108.9**

Sample 2	Expected Concentrations (ng/mL)	Determined Concentration (ng/ml)	Recovery (%)
Neat	N/A	0.93	N/A
Low	1.45	1.44	99.3
Medium	1.83	1.96	107.1
Medium-High	2.55	2.77	108.6
High	3.15	3.40	107.9
		Mean % Recovery	**105.7**

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Imprecision

This assay exhibits total imprecision of ≤ 10% across the assay range. One study, using commercially available human serum based control material generating one to two assays per day, 3 replicates per assay, over 15 days provides the following data, analyzed via analysis of variance (ANOVA).(11,12).

Sample	Grand Mean (n=89) (ng/mL)	Within-run (%CV)	Total Imprecision (%CV)
Low	0.67	5.7	7.5
Medium	1.90	3.6	5.2
High	2.97	3.2	4.0

Precision established at UCDMC

Analyzer	Type of Precision	Sample Type	n	Mean (ng/mL)	1 SD	%CV
DxI800-602049	Within-run	Low QC	60	1.047	0.074	7.1
		High QC	60	2.955	0.159	5.4
	Between-run	MAS ChemTrak 1	46	1.14	0.07	6.19
		MAS ChemTrak 3	46	3.00	0.17	5.51
DxI800-602053	Within-run	SYNCHRON 1	60	1.088	0.074	6.8
		SYNCHRON 3	60	3.088	0.146	4.7
	Between-run	MAS ChemTrak 1	45	1.13	0.09	7.56
		MAS ChemTrak 3	45	2.95	0.16	5.59

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Analytical Specificity/Interferences

Samples containing up to 10 mg/dL (171 µmol/L) bilirubin, lipemic samples containing the equivalent of 1800 mg/dL (20.32 mmol/L) triglycerides, and hemolyzed samples containing up to 1000 mg/dL (10 g/L) hemoglobin do not affect the concentration of digoxin assayed. In addition, 3 g/dL (30 g/L) human albumin added to the endogenous albumin in the sample does not affect the concentration of digoxin assayed.

The following table describes the cross-reactivity of the assay with substances that are similar in structure to digoxin.:

Substance	Analyte Added (ng/mL)	Cross-Reactivity (%)
Digoxin	1	103
Digitoxin	10	2.902
Digitoxigenin	10	1.926
Ouabain	1000	0.0202
Prednisone	1000	0.0008
Spironolactone	1000	0.0053
Digoxigenin	1.0	68.38
Aldosterone	100	0.0290
Cortisol	1000	0.0001
Furosemide	1000	0.0001
Progesterone	1000	0.0023
Testosterone	1000	0.0007

*Lumi-Phos is a trademark of Lumigen, Inc., a subsidiary of Beckman Coulter, Inc.
**Cosmocil CQ is a trademark of Arch Chemicals, Inc.
***ProClin is a trademark of Rohm and Haas Company or of its subsidiaries or affiliates.

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