TRAINING UPDATE

Lab Location:	SGMC	**Date Distributed:**	5/26/2021
Department:	Core Lab	**Due Date:**	6/26/2021

DESCRIPTION OF PROCEDURES

Name of procedure:

SOP #	Title
SGMC.C3058	Urine Amphetamines (Amp) by Atellica CH Analyzer
SGMC.C3059	Urine Barbiturates (Brb) by Atellica CH Analyzer
SGMC.C3060	Urine Benzodiazepines (Bnz) by Atellica CH Analyzer
SGMC.C3061	Urine Buprenorphine by Atellica CH Analyzer
SGMC.C3062	Urine Cannabinoids THC (Thc) by Atellica CH Analyzer
SGMC.C3063	Urine Cocaine (Coc) by Atellica CH Analyzer
SGMC.C3064	Urine Methadone (Mdn) by Atellica CH Analyzer
SGMC.C3065	Urine Opiates (Op) by Atellica CH Analyzer
SGMC.C3066	Urine Phencyclidine (Pcp) by Atellica CH Analyzer

Description of change(s):

These are the new assay SOPs for the Atellica Solution analyzers. Core technical staff must review and be familiar with -

- Specimen requirements
- Reagent, calibrator & QC stability and storage
- Ranges and dilutions

These SOPs were implemented on May 19, 2021

Document your compliance with this training update by taking the quiz in the MTS system.

Technical SOP

Title	**Urine Amphetamines (Amp) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Amphetamines, Qualitative	Atellica CH Analyzer	UAMPT

Synonyms/Abbreviations
"Speed"/AMP Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Amp assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The Atellica CH Amp assay uses the Syva® *Emit® II Plus* Amphetamines reagents filled into Atellica CH containers. The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that is measured spectrophotometrically. Endogenous G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: 12 months
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Amphetamines (Amp)	Siemens, Atellica CH, Cat. No. 11097506

4.2 Reagent Preparation and Storage

Reagent	**Amphetamines (Amp)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

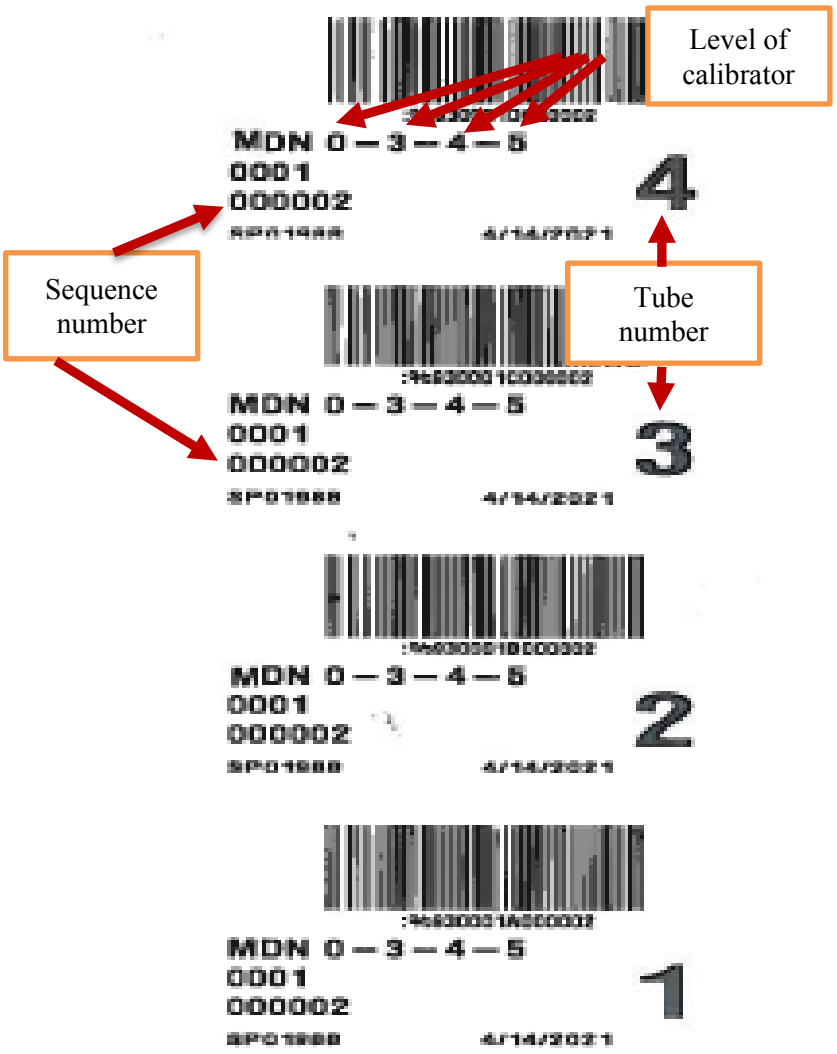
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Level 4 is not required for calibration of Amphetamines (Amp)

Calibrator	**Supplier and Catalog Number**
Syva® Emit® Calibrators/Controls Levels 0, 1, 2, 3, 5	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 1, Cat. No. 10445407 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409 Level 5, Cat. No. 10445411

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (20 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	**THEN……**
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Amphetamines (Amp) are required to perform this test.

Amphetamines are performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Amphetamines (Amp) is 1000 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Amphetamines.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Amphetamines or Amphetamines are present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Amphetamines tests are ordered:
"This is a screening assay. Amphetamines are detected in concentrations at or above 1000 ng/mL. The ingestion of certain herbal or plant products containing Ephdra or its metabolites may cause false positive Amphetamines results. A more specific testing method GCMS is available from the lab".

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL

THC	50 ng/mL
Opiates	300 ng/mL
Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Amphetamines are central nervous system stimulants that produce wakefulness, alertness, increased energy, reduced hunger, and an overall feeling of well-being. Amphetamines can be inhaled, taken orally, intravenously, or by smoking. Amphetamines are readily absorbed from the gastrointestinal tract and are then either deactivated by the liver or excreted unchanged in the urine. The relative importance of these elimination modes depends on urinary pH. Amphetamine is metabolized to deaminated (hippuric and benzoic acids) and hydroxylated metabolites. Methamphetamine is partially metabolized to amphetamine, its major active metabolite. Amphetamines appear in urine within three hours after any type of administration4 and can be detected by this Atellica CH assay for as long as 24–48 hours after the last dose.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 150 – 1800 ng/mL (for 1000 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Control Level 1	345.1	0.75	0.2
Calibrator (1000 ng/mL)	373.8	0.95	0.3
Control Level 2	401.1	0.85	0.2

14.3 Interfering Substances

Selegiline, a prescription medication used in the treatment of Parkinson's disease, metabolizes to l‑amphetamine and l‑methamphetamine. Therefore, patients taking selegiline may test positive by amphetamine assays.
See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and an LoD of ≤ 150 ng/mL for Amp1000. The LoD for the Atellica CH Amp assay is 121 ng/mL for Amp1000, and a LoB of 83 ng/mL for Amp1000.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent c ntains 2-methyl-2H-isothiazol-3-one hydrochloride. May produce an allergic reaction. (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Amphetamines Reagent

17. REFERENCES

1. Package Insert, Amphetamines Reagent, Siemens Healthcare Diagnostics Inc., 07/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Barbiturates (Brb) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Barbiturates, Qualitative	Atellica CH Analyzer	UBART

Synonyms/Abbreviations
BARB Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Brb assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The Atellica CH Brb assay uses the Syva® *Emit® II Plus* Barbiturate reagents filled into Atellica CH containers.
The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that is measured spectrophotometrically. Endogenous G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: Duration not specified in insert
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Barbiturates (Brb)	Siemens, Atellica CH, Cat. No. 11097507

4.2 Reagent Preparation and Storage

Reagent	**Barbiturates (Brb)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

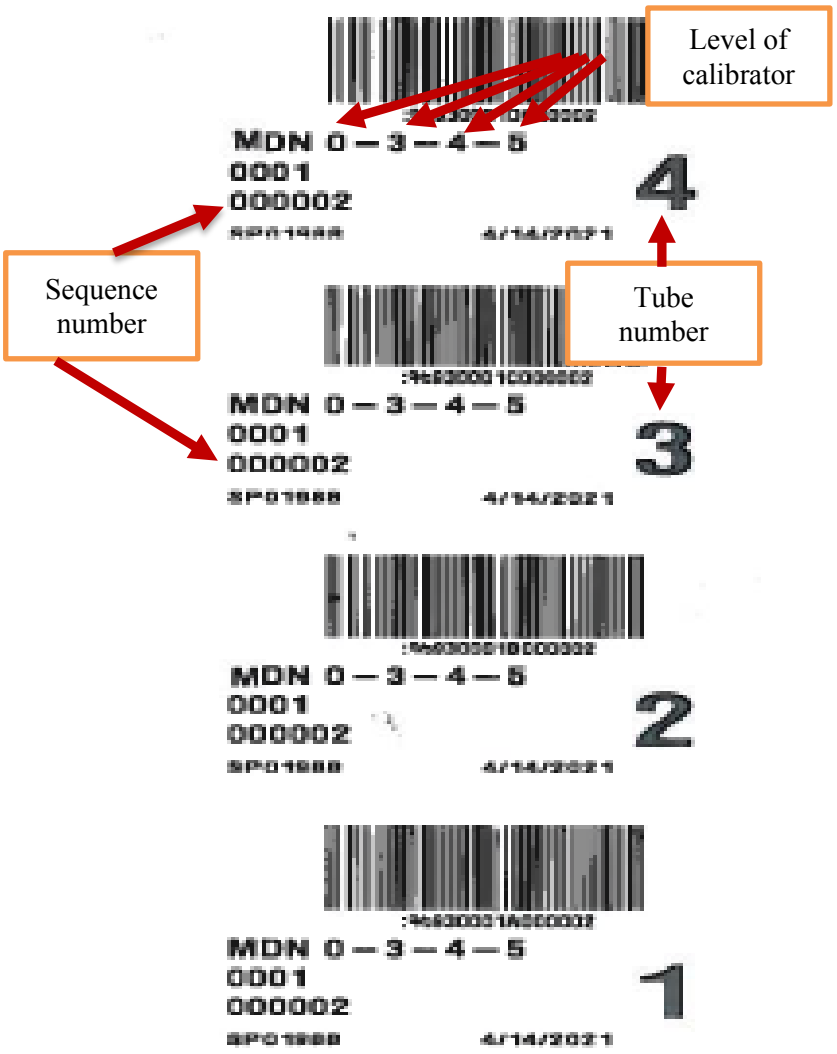
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Level 1 is not required for calibration of Barbiturates (Brb)

Calibrator	**Supplier and Catalog Number**
Syva® Emit® Calibrators/Controls Levels 0, 2, 3, 4, 5	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409 Level 4, Cat. No. 10445410 Level 5, Cat. No. 10445411

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (30 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and in the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Barbiturates (Brb) are required to perform this test.

Barbiturates are performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Barbiturates (Brb) is 200 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Barbiturates.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Barbiturates or Barbiturates are present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Barbiturates tests are ordered:

"This is a screening assay. Barbiturates are detected in concentrations at or above 200 ng/mL.".

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL
Opiates	300 ng/mL

Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Barbiturates, a class of nervous system depressants, are usually taken orally, but are sometimes injected intravenously or intramuscularly. They are absorbed rapidly; 30 to 40% is bound to plasma protein, and the rest is distributed to muscle, fat, and to the liver (where they are ultimately inactivated). They are classified based on their duration of action, ranging from very short acting (approximately 15 minutes) to long acting (a day or more). Some of the most commonly abused barbiturates are the short-acting ones, including pentobarbital and secobarbital. An example of a long-acting barbiturate is phenobarbital. The ratio of unchanged drug to metabolites varies depending upon duration of action. Short-acting barbiturates will generally be excreted in urine as metabolites, while the long-acting barbiturates will primarily appear unchanged.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 40 – 750 ng/mL (for 200 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Calibrator (0 ng/mL)	123.2	0.4	0.3
Control Level 1	159.2	0.5	0.3
Calibrator (200 ng/mL)	171.9	0.5	0.3
Control Level 2	178.0	0.4	0.2
Control Level 3	185.1	0.6	0.3
Calibrator (300 ng/mL)	197.9	0.7	0.4

14.3 Interfering Substances

See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and LoD ≤ 40 ng/mL. The LoD for the Atellica CH Brb assay is 9 ng/mL, and LoB is 5 ng/mL.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol- 3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Barbiturates Reagent

17. REFERENCES

1. Package Insert, Barbiturates Reagent, Siemens Healthcare Diagnostics Inc., 07/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Benzodiazepines (Bnz) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Benzodiazepines, Qualitative	Atellica CH Analyzer	UBENZT

Synonyms/Abbreviations
"Bennies"/BENZ, Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Bnz assay is a homogeneous immunoassay that is used for the qualitative or semiquantitative analysis of benzodiazepines in human urine. The Atellica CH Bnz assay uses the Syva® *Emit® II Plus* Benzodiazepine reagent filled into Atellica CH containers. The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. In the presence of glucose-6-phosphate (G6P), active enzyme converts nicotinamide adenine dinucleotide (NAD) to reduced nicotinamide adenine dinucleotide (NADH) resulting in an absorbance change that is measured spectrophotometrically at 340 and 410 nm. Endogenous G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the method.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: Duration not specified in insert
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Benzodiazepines (Bnz)	Siemens, Atellica CH, Cat. No. 11097505

4.2 Reagent Preparation and Storage

Reagent	**Benzodiazepines (Bnz)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

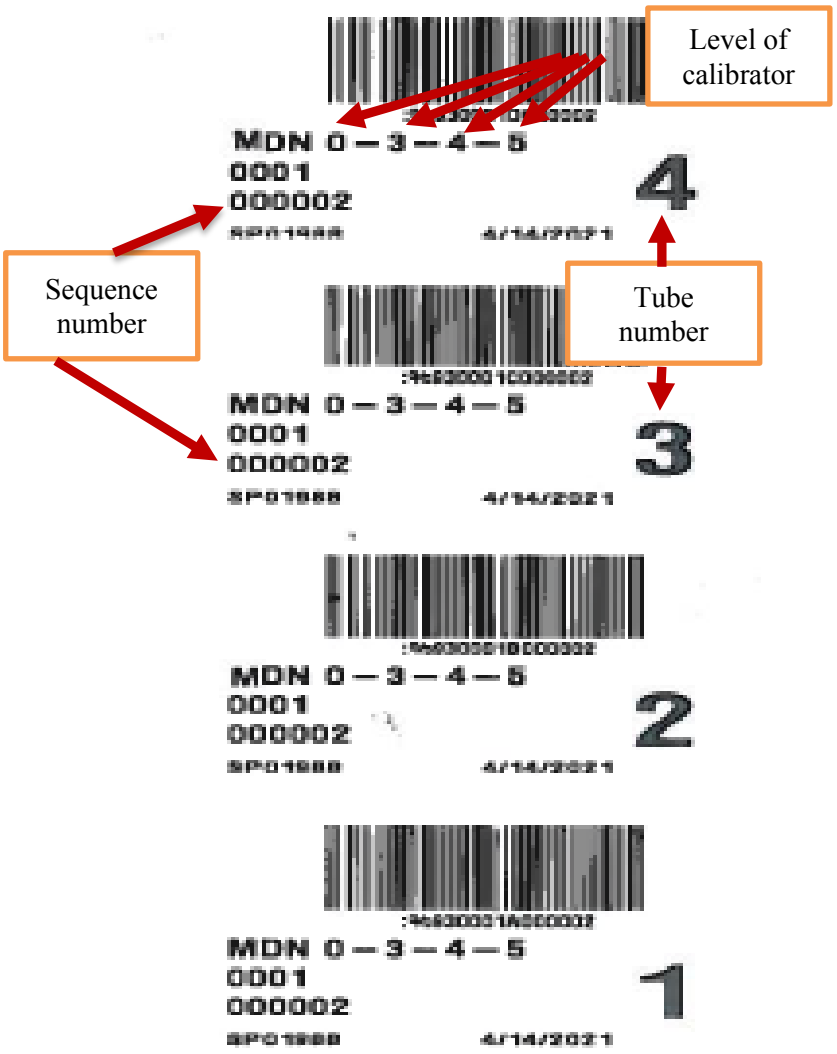
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Level 1 is not required for calibration of Benzodiazepines (Bnz)

Calibrator	Supplier and Catalog Number
Syva® Emit® Calibrators/Controls Levels 0, 2, 3, 4, 5	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409 Level 4, Cat. No. 10445410 Level 5, Cat. No. 10445411

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (20 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Benzodiazepines (Bnz) are required to perform this test.

Benzodiazepines are performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Benzodiazepines (Bnz) is 200 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Benzodiazepines.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Benzodiazepines or Benzodiazepines are present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Benzodiazepines tests are ordered:

"This is a screening assay. Benzodiazepines are detected in concentrations at or above 200 ng/mL".

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL
Opiates	300 ng/mL

Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Benzodiazepines are sedative-hypnotic drugs that are structurally similar and include widely used drugs such as chlordiazepoxide, diazepam, and oxazepam. The different benzodiazepines are absorbed at different rates, and the timing of their psychoactive effects varies with the absorption rate. Benzodiazepines are usually taken orally and are metabolized in the liver. Some benzodiazepine metabolites are pharmacologically active. Benzodiazepines potentiate the effect of other central nervous system depressants, such as ethyl alcohol.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 50 – 900 ng/mL (for 200 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Calibrator (0 ng/mL)	187.3	0.6	0.3
Control Level 1	223.8	0.7	0.3
Calibrator (200 ng/mL)	236.7	1.3	0.6
Control Level 2	240.3	0.7	0.3
Control Level 3	241.3	0.7	0.3
Calibrator (300 ng/mL)	249.8	0.6	0.2

14.3 Interfering Substances

See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and LoD ≤ 50 ng/mL. The LoD for the Atellica CH Bnz assay is 27 ng/mL, and a LoB of 15 ng/mL.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2- methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol-3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Benzodiazepine Reagent

17. REFERENCES

1. Package Insert, Benzodiazepine Reagent, Siemens Healthcare Diagnostics Inc., 11/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Buprenorphine by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Buprenorphine, Qualitative	Atellica CH Analyzer	UBUP

Synonyms/Abbreviations
Subutex®, BUP Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Emit II Plus Buprenorphine Assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The assay is based on competition between drug in the specimen and drug labeled with the recombinant glucose-6-phosphate dehydrogenase (rG6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH in the presence of glucose-6-phosphate (G6P), resulting in an absorbance change that is measured spectrophotometrically. Endogenous serum G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (Leuconostoc mesenteroides) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 5 days
	Refrigerated: 5 days
	Frozen: If storage longer than 5 days is required.
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis. Avoid repeat freeze/thaw cycles.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Buprenorphine Assay (consists of Antibody / Substrate Reagent 1 and Enzyme Reagent 2)	Siemens, Syva® Emit® II Plus, Cat. No. 10720048
EMPTY1 Reagent Pack	Siemens Atellica CH, Cat. No. 11538114
EMPTY2 Reagent Pack	Siemens Atellica CH, Cat. No. 11538115

Note: Reagents 1 and 2 are provided as a matched set. They should not be interchanged with components of kits with different lot numbers.

4.2 Reagent Preparation and Storage

Reagent	**Antibody/Substrate Reagent 1 & Enzyme Reagent 2**
Container	Plastic vial
Storage	Store at 2-8°C
Stability	When not in use, reagents must be stored at 2–8°C, upright and with screw caps tightly closed. If stored as directed, reagents are stable until the expiration date printed on the label. **Pre-filled Empty Reagent Pack:** Onboard per well is 28 days
Preparation	Reagent is liquid and ready to use. Transfer reagents into empty reagent packs according to the table below. Try to avoid bubbles as much as possible. Label the reagent packs with reagent name, lot number, date prepared, and expiration date.

Buprenorphine Reagent	Empty Reagent	Volume per Well	Tests per Well
Reagent 1 Antibody / Substrate	EMPTY1, Well 1 (W1)	14.0 mL	100
Reagent 2 Enzyme	EMPTY2, Well 1 (W1)	7.0 mL	100

4.3 Loading Pre-filled Empty Reagent Pack on Atellica CH

Note: Load one set of Empty Reagent Pack on board at a time. Since there is no way to differentiate between empty flexes on board, operator must load one set of Empty Reagent Pack and identify them before loading the next set.

Load one set of Empty Reagent Pack on board. On the Atellica CH screen the reagent picture will generate a red flag. Select the reagent picture highlighted in red to select the method and lot number.

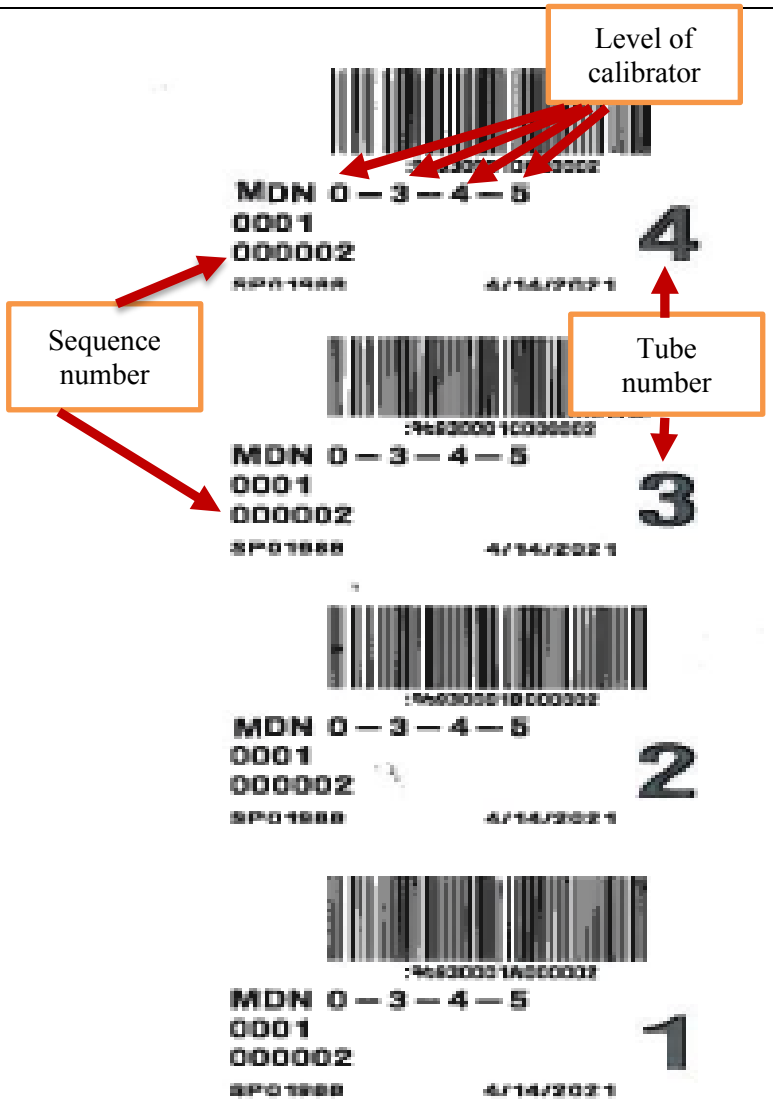
5. CALIBRATORS/STANDARDS

5.1 Calibrators/Standards Used

Calibrator	Supplier and Catalog Number
Emit® Calibrator/Control Level 0	Siemens Syva® Emit, Cat. No. 10445406
Emit® II Plus Specialty Drug Calibrator/Control Levels 1, 2, 3, & 4	Siemens Syva® Emit, Cat. No. 10720049 - 10720052

5.2 Calibrator Preparation and Storage

Calibrator	Emit® Calibrator/Control Level 0 and Emit® II Plus Specialty Drug Calibrator/Control Levels 1, 2, 3, & 4
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8° C, upright. • If stored as directed, calibrators are stable until the expiration date printed on the label.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Emit® Calibrator/Control Level 0 and Emit® II Plus Specialty Drug Calibrator/Control Levels 1, 2, 3, & 4
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (8 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (8 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Specialty Drug Controls Negative	Siemens Syva® Emit® II Plus, Cat. No. 10718700
Specialty Drug Controls Positive	Siemens Syva® Emit® II Plus, Cat. No. 10718701

6.2 Control Preparation and Storage

Control	Syva Emit II Plus Controls Negative and Positive
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. • Print labels from the Atellica and label glass tube vial. • Aliquot about 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8C • When stored at 2-8C the controls are stable opened or unopened in the original container until the expiration date printed on the vial. • On board Atellica, QC vials remain stable for 7 days.

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Buprenorphine is required to perform this test.

Buprenorphine is performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Buprenorphine is 5 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Buprenorphine.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Buprenorphine or Buprenorphine is present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Buprenorphine test is ordered:

> This is a screening assay. Buprenorphine is detected in concentration at or above 5 ng/mL

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

> The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL
Opiates	300 ng/mL

Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Buprenorphine is a semi-synthetic opioid analgesic derived from thebaine, a component of the opium poppy Papaver somniferum. Buprenorphine structurally resembles morphine, but has both antagonist and agonist properties. Buprenorphine is a schedule III drug. The Food and Drug Administration (FDA) has approved the use of Suboxone, which contains buprenorphine for treatment of opiate dependency in the US. Under the US Drug Abuse Treatment Act of 2000 (DATA) buprenorphine can be prescribed in a physician's office for treatment of opiate dependency.

It has been shown that buprenorphine has abuse potential and may itself cause dependency. It produces typical opioid effects and side effects such as euphoria and respiratory depression. Buprenorphine is metabolized in the human liver primarily by N-dealkylation to pharmacologically active norbuprenorphine, which along with the parent compound is conjugated to form buprenorphine glucuronide and norbuprenorphine glucuronide.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 0.7 – 25 ng/mL (for 5 ng/mL cutoff)

14.2 Precision

Urine Pool (ng/mL)	% of Cutoff	# of Results	Repeatability Results	Within-Laboratory Results
1.25	-75%	80	80 Negative	80 Negative
8.75	+75%	80	80 Positive	80 Positive

14.3 Interfering Substances

None

14.4 Clinical Sensitivity/Specificity/Predictive Values

Not available

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Buprenorphine Reagent

17. REFERENCES

1. Package Insert, Buprenorphine Reagent, Siemens Healthcare Diagnostics Inc., 05/2019.
2. Package Insert, Emit Calibrator, Siemens Healthcare Diagnostics Inc., 05/2019.
3. Package Insert, Emit II Plus Specialty Drug Calibrator, Siemens Healthcare Diagnostics Inc., 05/2019.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Cannabinoids THC (Thc) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Cannabinoids, Qualitative	Atellica CH Analyzer	UTHCT

Synonyms/Abbreviations
THC, Marijuana, Hashish Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Thc assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The Atellica CH Thc assay uses the Syva® *Emit® II Plus* Cannabinoid reagents filled intoAtellica CH containers. The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that is measured spectrophotometrically. Endogenous serum G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: 12 months
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Cannabinoids THC (Thc)	Siemens, Atellica CH, Cat. No. 11097503

4.2 Reagent Preparation and Storage

Reagent	**Cannabinoids THC (Thc)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

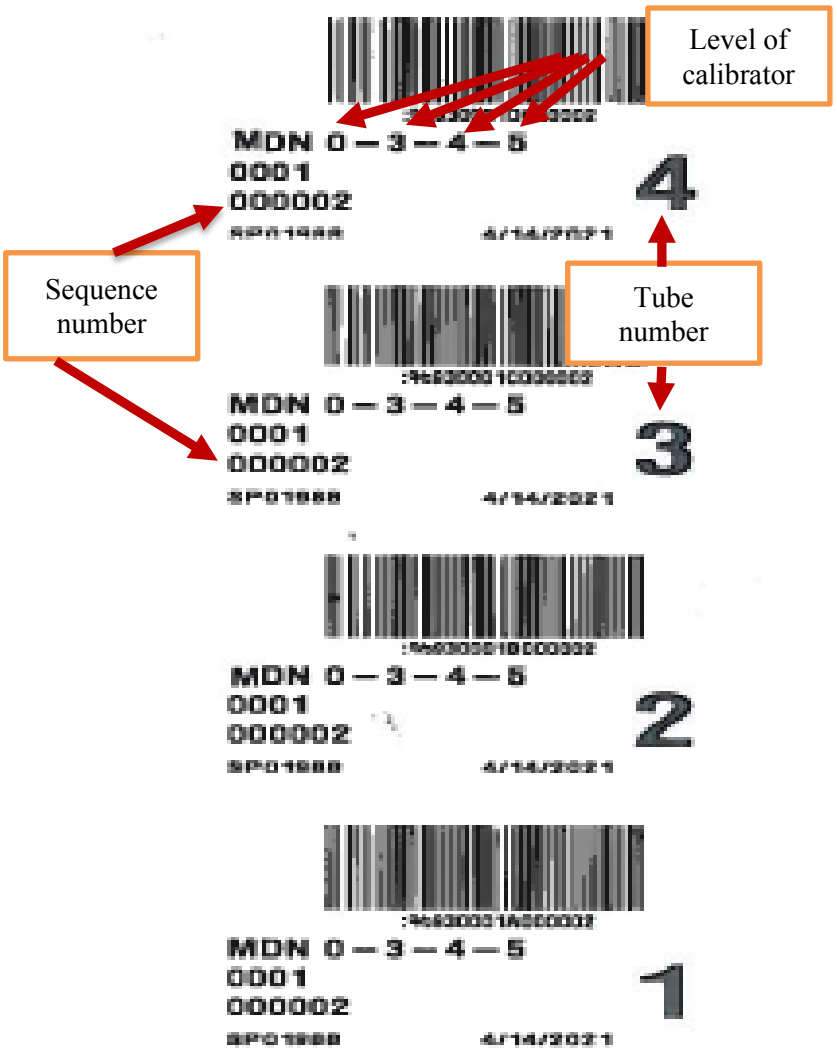
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Level 1 is not required for calibration of Cannabinoids THC (Thc)

Calibrator	Supplier and Catalog Number
Syva® Emit® Calibrators/Controls Levels 0, 2, 3, 4, 5	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409 Level 4, Cat. No. 10445410 Level 5, Cat. No. 10445411

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (5 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Cannabinoids THC (Thc) are required to perform this test.

Cannabinoids THC are performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Cannabinoids THC (Thc) is 50 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Cannabinoids THC.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Cannabinoids THC or Cannabinoids THC are present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Cannabinoids THC tests are ordered:

"This is a screening assay. Cannabinoids THC are detected in concentrations at or above 50 ng/mL.".

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL

Opiates	300 ng/mL
Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Marijuana is a mixture of dried leaves and flowering tops of the plant *Cannabis sativa L*. The agents that produce the hallucinogenic and other biological effects of marijuana are called cannabinoids. The cannabinoid Δ9-tetrahydrocannabinol (Δ9-THC) is the principal psychoactive ingredient in marijuana and hashish. The compound Δ9-THC is quickly and effectively absorbed by inhalation or from the gastrointestinal tract, and is almost completely metabolized by liver enzymes. Peak plasma levels of Δ9-THC occur within 10 minutes of inhalation and approximately 1 hour after ingestion. Approximately 30% of a dose of THC is excreted as urinary metabolites within 72 hours after exposure. Concentration depends on the total amount of THC absorbed, frequency of abuse, rate of release from fatty tissue, and time of specimen collection with respect to use. In chronic users, THC may accumulate in fatty tissue faster than it can be eliminated. This accumulation leads to longer detection times in urinalysis for chronic users than for occasional users.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 15 – 180 ng/mL (for 50 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Control Level 1	23	0.9	3.7
Calibrator (50 ng/mL)	47	1.0	2.0
Control Level 2	80	0.7	1.2

14.3 Interfering Substances

See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and a LoD of ≤ 15 ng/mL for Thc50. The LoD for the Atellica CH Thc assay is 7 ng/mL for Thc50, and a LoB of 6 ng/mL for Thc50.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol-3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Cannabinoids THC Reagent

17. REFERENCES

1. Package Insert, Cannabinoids Reagent, Siemens Healthcare Diagnostics Inc., 05/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Cocaine (Coc) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Cocaine, Qualitative	Atellica CH Analyzer	UCOCT

Synonyms/Abbreviations
COC, Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Coc assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The Atellica CH Coc assay uses the Syva® *Emit® II Plus* Cocaine reagents filled into Atellica CH containers. The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that is measured spectrophotometrically. Endogenous G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: Duration not specified in insert
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Cocaine Metabolite (Coc)	Siemens, Atellica CH, Cat. No. 11097504

4.2 Reagent Preparation and Storage

Reagent	**Cocaine Metabolite (Coc)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

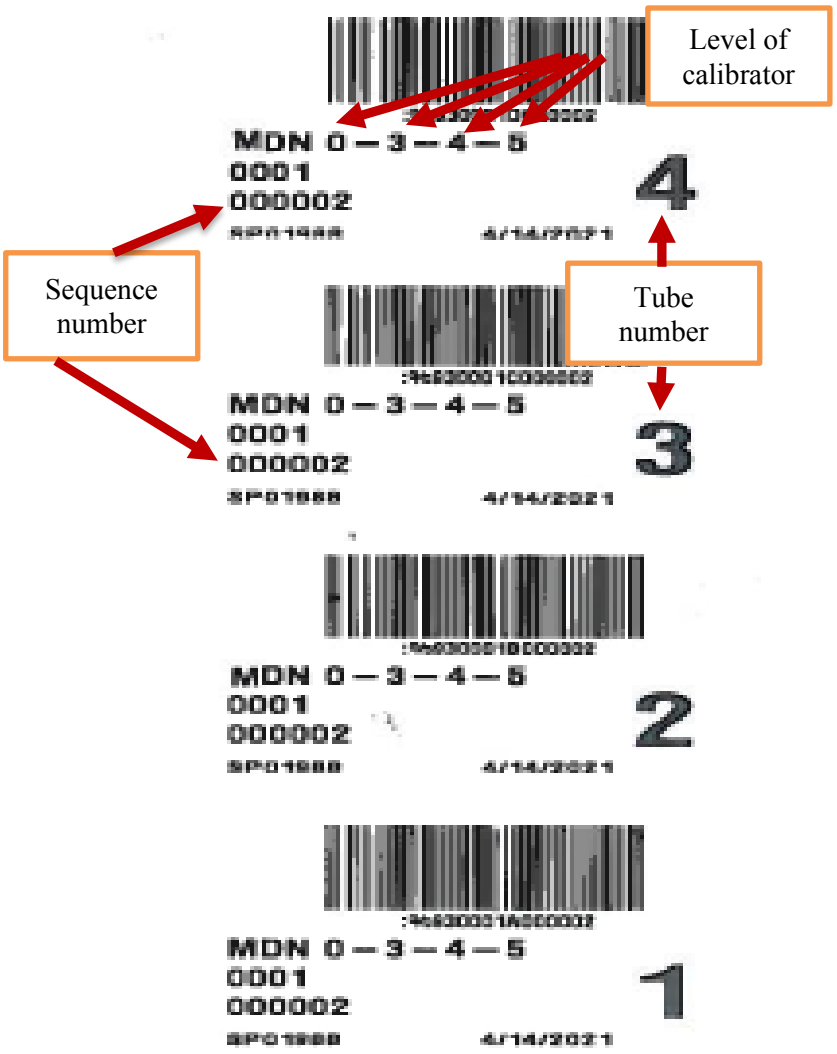
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Level 1 is not required for calibration of Cocaine (Coc)

Calibrator	Supplier and Catalog Number
Syva® Emit® Calibrators/Controls Levels 0, 2, 3, 4, 5	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409 Level 4, Cat. No. 10445410 Level 5, Cat. No. 10445411

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (40 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (20 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Cocaine Metabolite (Coc) are required to perform this test.

Cocaine Metabolite are performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Cocaine (Coc) is 300 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Cocaine.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Cocaine or Cocaine is present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Cocaine tests are ordered:

"This is a screening assay. Cocaine is detected in concentrations at or above 300 ng/mL".

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL

Opiates	300 ng/mL
Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Cocaine is a central nervous system stimulant that is extracted from the coca plant. As a drug of abuse, cocaine is self-administered in a variety of ways, including inhalation and intravenous injection. Cocaine base can be smoked in a form that is commonly known as crack cocaine (crack). Cocaine is rapidly absorbed, especially when smoked. While all forms are potentially addicting, crack is especially likely to lead to dependence because of its more rapid and heightened effect on the abuser. Excretion rate patterns vary with the mode of administration and from individual to individual. Cocaine is almost completely metabolized, primarily in the liver, with only about one percent excreted in the urine unchanged. Most cocaine is eliminated as benzoylecgonine, the major metabolite of cocaine. Cocaine is also excreted in relatively lesser amounts as ecgonine methyl ester and ecgonine. Cocaine metabolites may be detected in urine for up to a couple of days after cocaine is used. Benzoylecgonine can be detected in urine within four hours after cocaine inhalation and remain detectable in concentrations greater than 1000 ng/mL for as long as 48 hours.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 36 – 900 ng/mL (for 300 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Calibrator (0 ng/mL)	129.6	0.4	0.3
Control Level 1	154.7	0.4	0.2
Calibrator (150 ng/mL)	163.9	0.4	0.3

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Control Level 2	169.4	0.5	0.3
Control Level 3	175.0	0.5	0.3
Calibrator (300 ng/mL)	183.0	0.4	0.2

14.3 Interfering Substances

See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and LoD ≤ 36 ng/mL. The LoD for the Atellica CH Coc assay is 7 ng/mL, and a LoB of 4 ng/mL.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol-3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Cocaine Metabolite Reagent

17. REFERENCES

1. Package Insert, Cocaine Reagent, Siemens Healthcare Diagnostics Inc., 10/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.

3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Methadone (Mdn) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Methadone, Qualitative	Atellica CH Analyzer	UMETHD

Synonyms/Abbreviations
Methadose, Dolophine, METH Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Mdn assay is a homogeneous immunoassay that is used for the qualitative or semiquantitative analysis of methadone in human urine. The Atellica CH Mdn assay uses the Syva® *Emit® II Plus* Methadone reagents filled into Atellica CH containers. The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. In the presence of glucose-6-phosphate (G6P), active enzyme converts nicotinamide adenine dinucleotide (NAD) to reduced nicotinamide adenine dinucleotide (NADH) resulting in an absorbance change that is measured spectrophotometrically at 340/410 nm. Endogenous G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: Duration not specified in insert
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Methadone (Mdn)	Siemens, Atellica CH, Cat. No. 11097520

4.2 Reagent Preparation and Storage

Reagent	**Methadone (Mdn)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

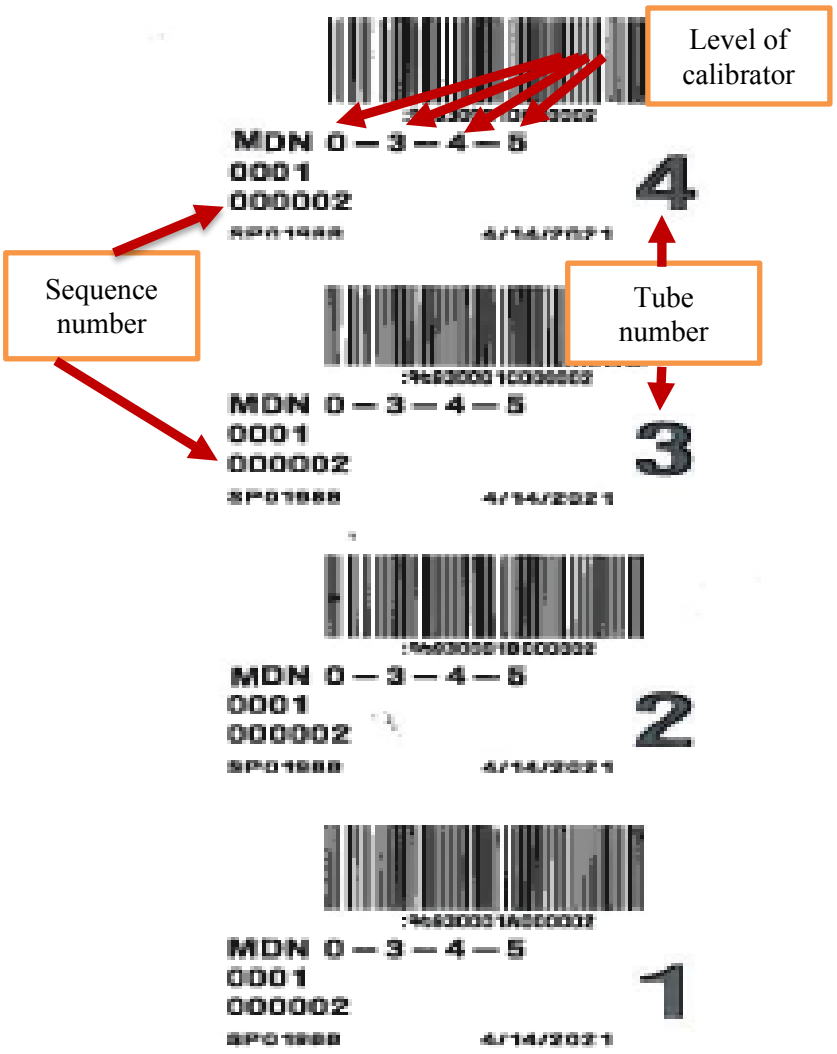
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Levels 1 and 2 are not required for calibration of Methadone (Mdn)

Calibrator	Supplier and Catalog Number
Syva® Emit® Calibrators/Controls Levels 0, 3, 4, 5	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 3, Cat. No. 10445409 Level 4, Cat. No. 10445410 Level 5, Cat. No. 10445411

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (20 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.5 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Methadone (Mdn) is required to perform this test.

Methadone is performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Methadone (Mdn) is 300 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Methadone.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Methadone or Methadone is present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Methadone tests are ordered:

"This is a screening assay. Methadone is detected in concentrations at or above 300 ng/mL.".

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL

Opiates	300 ng/mL
Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Methadone is a synthetic narcotic/analgesic drug that is administered orally or intravenously. Medically assisted withdrawal from opioids is usually accomplished using methadone. Methadone is frequently used in maintenance programs as a substitute for heroin or other abused opioids, while allowing the subject to successfully participate in drug rehabilitation. Patients are able to function well on methadone and perform complex tasks competently. Methadone is metabolized in the liver. The kidneys become a major route of methadone excretion at doses exceeding 50 mg/dL. Urine levels in methadone maintenance patients range from 1 to 5 μg/mL, 24 hours after methadone dose.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 90 – 900 ng/mL (for 300 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Calibrator (0 ng/mL)	119.0	0.4	0.3
Control Level 1	179.4	0.8	0.5
Calibrator (300 ng/mL)	225.7	0.7	0.3
Control Level 2	248.8	0.8	0.3

14.3 Interfering Substances

See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and an LoD of ≤ 90 ng/mL for Mdn300. The LoD for the Atellica CH Mdn assay 22 ng/mL for Mdn300, and 16 ng/mL for Mdn300.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol- 3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Methadone Reagent

17. REFERENCES

1. Package Insert, Methadone Reagent, Siemens Healthcare Diagnostics Inc., 11/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Opiates (Op) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Opiates, Qualitative	Atellica CH Analyzer	UOPIT

Synonyms/Abbreviations
OPI, Morphine Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Op assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The Atellica CH Op assay uses the Syva® *Emit® II Plus* Opiate reagents filled into Atellica CH containers. The assay is based on competition between drug in the specimen and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the sample can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that is measured spectrophotometrically. Endogenous serum G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: Duration not specified in insert
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Opiates (Op)	Siemens, Atellica CH, Cat. No. 11097502

4.2 Reagent Preparation and Storage

Reagent	**Opiates (Op)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

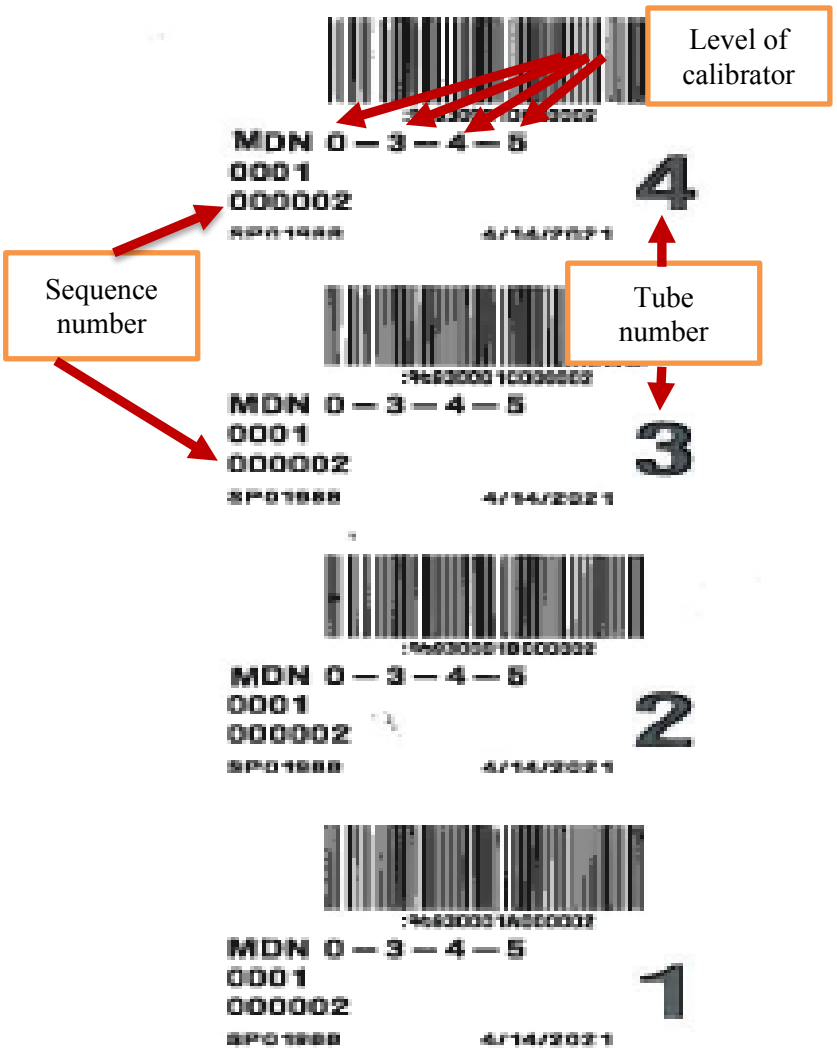
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Levels 4 and 5 are not required for calibration of Opiates (Op)

Calibrator	Supplier and Catalog Number
Syva® Emit® Calibrators/Controls Levels 0, 1, 2, 3	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 1, Cat. No. 10445407 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (30 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.5 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Opiates (Op) are required to perform this test.

Opiates are performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Opiates (Op) is 300 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Opiates.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Opiates or Opiates are present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Opiates tests are ordered:

"This is a screening assay. Opiates are detected in concentrations at or above 300 ng/mL."

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL
Opiates	300 ng/mL

Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Opiates are a class of compounds that includes morphine, codeine, and heroin. Morphine and codeine are naturally occurring alkaloids that are found in opium, a substance exuded from the unripe seed pod of the opium poppy *Papaver somniferum*. Heroin is a semisynthetic derivative of morphine. Morphine is a potent analgesic. Codeine is used in analgesic preparations and as a cough suppressant. Heroin is an even more potent analgesic than morphine. Both morphine and codeine are legitimate drugs. Heroin is a drug of abuse that may be snorted, smoked, or dissolved and injected subcutaneously or intravenously. Opiates are absorbed rapidly. Heroin is converted almost immediately to morphine, which is excreted in urine both unchanged and as a glucuronidated metabolite. Excretion takes place over a period of a couple of days. Codeine is excreted in urine as a glucuronidated conjugate, as free and conjugated norcodeine, and as morphine. The presence of opiates in the urine indicates the use of heroin, morphine, and/or codeine.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 75 – 1800 ng/mL (for 300 ng/mL cutoff)

14.2 Precision

Material	Mean mAU/min	Standard Deviation (%CV)	
		Repeatability	Within-Lab
Calibrator (0 ng/mL)	105	0.5	0.5
Control Level 1	127	0.6	0.5
Calibrator (300 ng/mL)	142	0.6	0.5
Control Level 2	154	0.6	0.4

14.3 Interfering Substances

See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Detection Capability
The assay is designed to have a limit of blank (LoB) ≤ limit of detection (LoD) and an LoD of ≤ 75 ng/mL for Op300. The LoD for the Atellica CH Op assay is 27 ng/mL for Op300, and a LoB of 17 ng/mL for Op300.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol-3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Opiates Reagent

17. REFERENCES

1. Package Insert, Opiates Reagent, Siemens Healthcare Diagnostics Inc., 10/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None

Technical SOP

Title	**Urine Phencyclidine (Pcp) by Atellica CH Analyzer**
Prepared by	Ashkan Chini Date: 5/3/2021
Owner	Robert SanLuis Date: 5/3/2021

Laboratory Approval	**Local Effective Date:**	
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		

TABLE OF CONTENTS

1. TEST INFORMATION

Assay	Method/Instrument	Test Code
Urine Phencyclidine, Qualitative	Atellica CH Analyzer	UPCPT

Synonyms/Abbreviations
PCP, Angel Dust, Included in Batteries/Packages: Urine Drug Screen: UDRGS (SGMC)

Department
Chemistry

2. ANALYTICAL PRINCIPLE

The Atellica CH Pcp assay is a homogenous enzyme immunoassay based on competition between drug in the specimen and drug labeled with glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. G6PDH activity decreases upon binding to the antibody, so the drug concentration in the specimen can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD+) to NADH in the presence of glucose-6-phosphate (G6P), resulting in an absorbance change that is measured spectrophotometrically at 340/410 nm. Endogenous G6PDH does not interfere because the coenzyme NAD+ functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

3. SPECIMEN REQUIREMENTS

3.1 Patient Preparation

Component	Special Notations
Specimen Collection and/or Timing	Freshly voided urine specimens should be used for testing.
Special Collection Procedures	No additives or preservatives are needed. Adulteration of the urine specimen may cause erroneous results. If adulteration is suspected, obtain a fresh specimen. Urine specimens should be handled and treated as if they are potentially infected. Preferred method is the Urine Collection Kit with specimen transferred to Urine Chemistry Collection Tube (yellow top).
Other	If Urine Collection Kit is not used, submit to Laboratory within 2 hours of collection.

3.2 Specimen Type & Handling

Criteria	
Type -Preferred **-Other Acceptable**	Urine None
Collection Container	Urine Collection Kit or sterile container
Volume - Optimum **- Minimum**	15 mL 2 mL
Transport Container and Temperature	Urine Chemistry Collection Tube (yellow top) or container at room temperature.
Stability & Storage Requirements	Room Temperature: 7 days
	Refrigerated: 30 days
	Frozen: 12 months
Timing Considerations	Deliver specimens to laboratory immediately.
Unacceptable Specimens & Actions to Take	Specimens that are unlabeled, improperly labeled, or those that do not meet the stated criteria are unacceptable. Samples in Urine Analysis Preservative Tube are NOT acceptable. Request a recollection and credit the test with the appropriate LIS English text code for "test not performed" message. Examples: Quantity not sufficient-QNS; Wrong collection-UNAC. Document the request for recollection in the LIS.
Compromising Physical Characteristics	Turbidity: Centrifuge turbid samples before analysis. Frozen: Thaw and mix thoroughly prior to analysis.
Other Considerations	Boric Acid should not be used as a preservative. Plastic transfer pipettes should NOT be used for delivering patient specimens. Before placing on system, ensure samples are free of: • Bubbles or foam • Particulate matter

NOTE: Labeling requirements for all reagents, calibrators and controls include: (1) Open date, (2) Substance name, (3) Lot number, (4) Date of preparation, (5) Expiration date, (6) Initials of tech, and (7) Any special storage instructions. Check all for visible signs of degradation. When placed onboard the analyzer, the instrument captures the date / time loaded and calculates and tracks the opened expiration.

4. REAGENTS

The package insert for a new lot of kits must be reviewed for any changes before the kit is used. A current Package Insert is included as a Related Document.

4.1 Reagent Summary

Reagents	Supplier & Catalog Number
Phencyclidine (Pcp)	Siemens, Atellica CH, Cat. No. 11097509

4.2 Reagent Preparation and Storage

Reagent	**Phencyclidine (Pcp)**
Storage	Store at 2-8°C
Stability	Onboard per well: 30 days
Preparation	Reagent is liquid and ready to use.

5. CALIBRATORS/STANDARDS

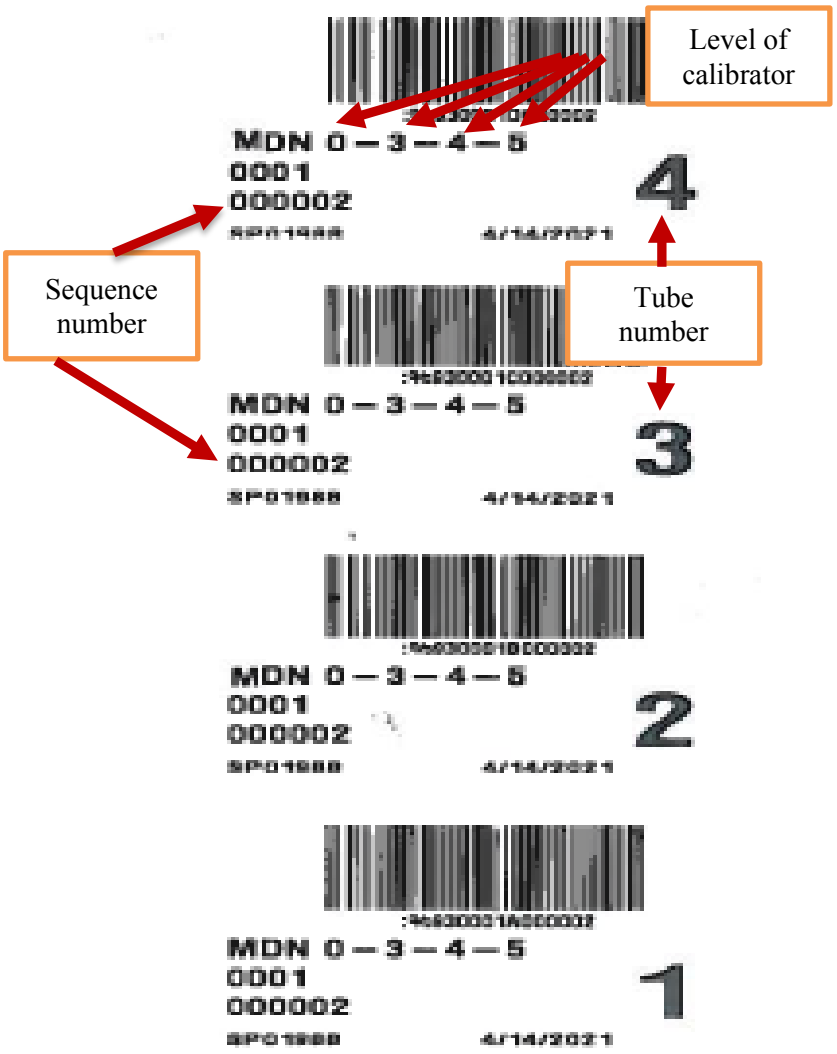
5.1 Calibrators/Standards Used

Note: Syva® Emit® Calibrator/Control Levels 1 and 5 are not required for calibration of Phencyclidine (Pcp)

Calibrator	Supplier and Catalog Number
Syva® Emit® Calibrators/Controls Levels 0, 2, 3, 4	Siemens Syva® Emit® Calibrators/Controls: Level 0, Cat. No. 10445406 Level 2, Cat. No. 10445408 Level 3, Cat. No. 10445409 Level 4, Cat. No. 10445410

5.2 Calibrator Preparation and Storage

Calibrator	Syva® Emit® Calibrators/Controls
Preparation	**Note:** Glass tubes must be used to store Syva® Emit® Calibrators Controls onboard. Some plastics can absorb certain drugs. The calibrators are provided ready to use. Print labels from the Atellica and label glass tube vials. Note: The labels generated by the instrument will have: a. Tube numbers 1 through 4 or 5 (depending on the number of calibrators used) b. Level of calibrator c. Sequence number In the example below: Tube number 1 is assigned to calibrator 0 Tube number 2 is assigned to calibrator 3 Tube number 3 is assigned to calibrator 4 Tube number 4 is assigned to calibrator 5 If an individual label is lost or damaged and there is a need to reprint the label, Atellica will reprint the entire set with a different sequence number. Do not relabel tubes individually, instead relabel the entire set so every tube will have the same sequence number.

	 • Aliquot about 2 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	• Store at 2-8°C • **Unopened:** stable until expiration date stamped on the box. • **Opened:** stable for 5 weeks when recapped and stored at 2-8°C when not in use.

5.3 Calibration Parameter

Criteria	Special Notations
Reference Material	Syva® Emit® Calibrators/Controls
Assay Range	See Package Insert for specific assay ranges.
Suggested Calibration Level	See Reagent Package Insert for lot specific assigned values in ng/mL

Frequency	• When changing lot numbers of primary reagent packs. • At the end of the lot calibration interval (60 days), for a specified lot of calibrated reagent on the system. • At the end of pack calibration interval (19 days), for calibrated reagent packs on the system. • When indicated by quality control results. • After major maintenance or service. At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.
Calibration Scheme	See Package Insert for specific calibration scheme.
Procedure	Refer to the Atellica Solution Operating, QC, Calibration and Maintenance procedure for specific instructions.

5.4 Tolerance Limits

IF……	THEN……
If result fall within assay-specific specification, and QC values are within acceptable limits,	proceed with analysis
If result falls outside assay-specific specification, or QC values are out of Acceptable limits,	troubleshoot the assay and/or instrument and repeat calibration

6. QUALITY CONTROL

6.1 Controls Used

Controls	Supplier and Catalog Number
Liquichek™ Urine Toxicology Control Levels S1E and S2E Low Opiate	Bio-Rad Laboratories Cat. No. 423 and 424

6.2 Control Preparation and Storage

Control	Liquichek Urine Toxicology Control Levels S1E and S2E Low Opiate
Preparation	**Note:** Glass tubes must be used to store Urine Drugs of Abuse Control onboard. Some plastics can absorb certain drugs. Before sampling allow the control to reach room temperature (18-25°C) and swirl gently to ensure homogeneity. • Print labels from the Atellica and label glass tube vial. • Aliquot approximately 3 mL in each glass tube vial. • Immediately load onto the instrument.
Storage/Stability	**Unopened:** stable until the expiration date at 2-8°C **Opened:** all analytes will be stable for 30 days at 2-8°C

6.3 Frequency

Analyze all levels of QC material after every calibration and each day of testing (notated on the QC frequency sheets posted on the instruments).

Refer to the Siemens Atellica QC Schedule and the Siemens Atellica Quick Reference Guide.

6.4 Tolerance Limits and Criteria for Acceptable QC

Step	Action
1	Acceptable ranges for QC are programmed into the instrument's Quality Control software system and Unity Real Time, and may be posted near the instrument for use during computer downtime.
2	**Run Rejection Criteria** • Anytime the established parameters are exceeded, the run is considered out of control (failed) and patient results must not be reported. • The technologist must follow the procedure in the Laboratory QC Program to resolve the problem.
3	**Corrective Action**: • All rejected runs must be effectively addressed through corrective action. Steps taken in response to QC failures must be documented. Patient samples in failed analytical runs must be reanalyzed according to the Laboratory QC Program. Supervisors may override rejection of partial or complete runs only with detailed documentation and criteria for overrides that are approved by the Medical Director. Consult corrective action guidelines in Laboratory QC Program. Follow corrective action guidelines in the Laboratory QC Program. • Corrective action documentation must follow the Laboratory Quality Control Program.
4	**Review of QC** • QC must be reviewed weekly by the Group Lead or designee and monthly by the Supervisor/Manager or designee.

6.5 Documentation

- QC tolerance limits are programmed into the instrument and Unity Real Time.
- Quality control records are reviewed daily at the bench, weekly by the Group Lead or designee, and monthly by the Supervisor/Manager or designee.
- Refer to complete policies and procedures for QC documentation and for record retention requirements in the Laboratory QC Program.

6.6 Quality Assurance Program

- Each new lot number of reagent or new shipment of the same lot of reagent must be tested with external control materials and previously analyzed samples. Performance of the new lot must be equivalent to the previous lot.
- Training must be successfully completed and documented prior to performing this test. This procedure must be incorporated into the departmental competency assessment program.
- The laboratory participates in CAP proficiency testing. All proficiency testing materials must be treated in the same manner as patient samples.
- Monthly QC must be presented to the Medical Director or designee for review and signature.
- Monthly QC mean and SD are sent to Bio-Rad Laboratories for peer group comparison.
- Consult the Laboratory QC Program for complete details.

7. EQUIPMENT and SUPPLIES

7.1 Assay Platform

Siemens Atellica CH Analyzer

7.2 Equipment

- Refrigerator capable of sustaining 2–8°C.
- Freezer capable of sustaining range not to exceed -20 to -50°C.
- Centrifuge

7.3 Supplies

- System Fluids
- Assorted calibrated pipettes (MLA or equivalent) and disposable tips

8. PROCEDURE

Atellica CH Phencyclidine (Pcp) is required to perform this test.

Phencyclidine is performed on the Atellica CH Analyzer after the method is calibrated and Quality Controls are acceptable.

NOTE: For all procedures involving specimens, buttoned lab coats, gloves, and face protection are required minimum personal protective equipment. Report all accidents to your supervisor.

8.1	Instrument Set-up Protocol
1.	Perform any required instrument maintenance.
2.	Ensure that the instrument has sufficient primary and ancillary reagents.
3.	Check status of cuvettes and tips. Check waste levels. Fill or empty as appropriate.
4.	Check calibration status and re-calibrate as needed.

8.2	Specimen Testing
1.	Centrifuge the specimens.
2.	Load the sample in the Atellica rack and place the rack into the Sample Handler to initiate testing. **NOTE: If not equipped with an in-line decapper unit, samples must be de-capped prior to loading on the Atellica system
3.	Refer to the general operating procedure for detailed steps.
4.	Follow protocol in section 10.6 “Repeat Criteria and Resulting” for samples with results above the analytical measurement range (AMR). Investigate any flagged results and repeat as necessary.
5.	Append the appropriate English text code qualifier messages to any samples requiring a comment regarding sample quality and/or any other pertinent factors.

NOTE: In the event that the test system becomes inoperable, notify supervision or designee for further direction. Patient specimens must be stored in a manner that maintains the integrity of the specimen.

9. CALCULATIONS

None

10. REPORTING RESULTS AND REPEAT CRITERIA

10.1 Interpretation of Data

The cutoff analyte value for the Phencyclidine (Pcp) is 25 ng/mL.

Positive Results: A specimen that gives an analyte value greater than or equal to the cutoff analyte value is interpreted as "positive". The specimen is presumptive positive Phencyclidine.

Negative Results: A specimen that gives an analyte value less than the cutoff analyte value is interpreted as "negative". Either the specimen does not contain Phencyclidine or Phencyclidine is present in concentrations below the cutoff value for this assay.

10.2 Rounding

N/A

10.3 Units of Measure

N/A

10.4 Clinically Reportable Range (CRR)

N/A

10.5 Review Patient Data

Each result is reviewed for error messages. Resolve any problems noted before issuing patient reports.

10.6 Repeat Criteria and Resulting

Specimens that give an "Abnormal Reaction" message must be repeated.

If the result is Positive **and** the patient's location is L&D (Labor and Delivery), DI will flag the result to be held for repeat. Repeat the test, if possible run repeat on another analyzer:

- If repeat is positive, report as POSITIVE
- If repeat is none detected (NDT), run QC to verify instrument performance. If QC is within range on the same reagent lot as used for patient run, rerun patient sample a third time. Report result that duplicated (2 of 3 results).

Message	Code
Verified by repeat analysis	Append –REP to the result.

11. EXPECTED VALUES

11.1 Reference Ranges

None detected

11.2 Critical Values

None established

11.3 Standard Required Messages

The following comment is automatically added to the report by the LIS when a urine Phencyclidine tests are ordered:

> This is a screening assay. Phencyclidine is detected in concentrations at or above 25 ng/mL.

The following comment is automatically added to the report by the LIS when a urine drug screen is ordered:

> The drug of abuse panel is a screening assay. It detects the following drugs of abuse in concentrations at or above the concentrations listed below.

Phencyclidine	25 ng/mL
Benzodiazepines	200 ng/mL
Cocaine	300 ng/mL
Amphetamines	1000 ng/mL
THC	50 ng/mL
Opiates	300 ng/mL

Barbiturates	200 ng/mL
Methadone	300 ng/mL
Buprenorphine	5 ng/mL

The ingestion of certain herbal or plant products containing Ephedra or its metabolites may cause false positive amphetamine/metamphetamine results.

This test is for medical screening purposes ONLY. For confirmation a separate order for Gas Chromatography by Mass Spectrophotometry (GCMS) is required.

12. CLINICAL SIGNIFICANCE

Phencyclidine, also known as PCP and "angel dust", is a synthetic drug that was originally developed for its anesthetic properties, but is now a drug of abuse used solely for its potent hallucinogenic effects. It may be self-administered in a variety of ways including ingestion, inhalation, and intravenous injection. Phencyclidine is absorbed well and quickly, and concentrates in the brain and fatty tissues. Excretion patterns vary widely, ranging from several hours to a couple of weeks. Phencyclidine is excreted in the urine unchanged, as conjugated metabolites, and primarily as unidentified compounds.

13. PROCEDURE NOTES

- **FDA Status:** FDA Approved/Modified
- **Validated Test Modifications:** Removed pH testing of specimens, validation has been performed.

The instrument reporting system contains error messages to warn the operator of specific malfunctions. Any report slip containing such error messages should be held for follow-up.

14. LIMITATIONS OF METHOD

14.1 Analytical Measurement Range (AMR)

Qualitative Assay: 5 – 75 ng/mL (for 25 ng/mL cutoff)

14.2 Precision

Urine Pool (ng/mL)	% of Cutoff	# of Results	Repeatability Results	Within-Lab Results
0	-100	80	80 Neg	80 Neg
6.25	-75	80	80 Neg	80 Neg
12.5	-50	80	80 Neg	80 Neg
18.75	-25	80	80 Neg	80 Neg
25	Cutoff	80	60 Pos/20 Neg	60 Pos/20 Neg
31.25	25	80	80 Pos	80 Pos
37.5	50	80	80 Pos	80 Pos
43.75	75	80	80 Pos	80 Pos
50	100	80	80 Pos	80 Pos

14.3 Interfering Substances

Negative urine pools with specific gravity values ranging from 1.000–1.030 and pH values ranging from 3.1–11.0 were tested in the presence of two levels of controls at ±25% of the cutoff concentration (19 ng/mL and 31 ng/mL). No interference was observed.
See package insert for a complete list of interfering substances.

14.4 Clinical Sensitivity/Specificity/Predictive Values

Not available.

15. SAFETY

Refer to your local and corporate safety manuals and Safety Data Sheet (SDS) for detailed information on safety practices and procedures and a complete description of hazards.

Reagent 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. Wash contaminated clothing before reuse.
Contains: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol-3-one (3:1) (R1 and R2)

16. RELATED DOCUMENTS

1. Atellica Solution Operating, QC, Calibration and Maintenance procedure
2. Laboratory Quality Control Program
3. QC Schedule for Siemens Atellica Solution
4. Laboratory Safety Manual
5. Safety Data Sheets (SDS)
6. Quest Diagnostics Records Management Procedure
7. Atellica Solution System Error Messages Chart
8. Centrifuge Use, Maintenance and Function Checks (Lab policy)
9. Specimen Acceptability Requirements (Lab policy)
10. Repeat Testing Requirement (Lab policy)
11. Current package insert of Phencyclidine Reagent

17. REFERENCES

1. Package Insert, Phencyclidine Reagent, Siemens Healthcare Diagnostics Inc., 07/2019.
2. Package Insert, Syva® Emit® Calibrators/Controls, Siemens Healthcare Diagnostics Inc., 05/2017.
3. Package Insert, Liquichek Urine Toxicology Control Level S1E Low Opiate, Bio-Rad Laboratories, 04/2020.
4. Package Insert, Liquichek Urine Toxicology Control Level S2E Low Opiate, Bio-Rad Laboratories, 08/2020.

18. REVISION HISTORY

Version	Date	Section	Reason	Reviser	Approval

19. ADDENDA

None