510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE

A. 510(k) Number:

k163220

B. Purpose for Submission:

New device

C. Measurand:

Phencyclidine (PCP)

D. Type of Test:

Enzyme immunoassay

E. Applicant:

Siemens Healthcare Diagnostics Inc.

F. Proprietary and Established Names:

Atellica CH Phencyclidine (PCP)

G. Regulatory Information:

1. Regulation section:

   Enzyme Immunoassay, Phencyclidine

2. Classification:

   Unclassified, 510(k) required

3. Product code:

   LCM

4. Panel:

   Toxicology (91)

H. Intended Use:

1. Intended use(s):

   See indications for use below.

2. Indication(s) for use:

   The Atellica CH Phencyclidine (PCP) assay is for *in vitro* diagnostic use in the qualitative or semiquantitative analyses of phencyclidine in human urine using the Atellica CH Analyzer, using a cutoff of 25 ng/mL. The PCP assay provides only a preliminary analytical test result. A more specific alternative chemical method must be used to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method. The semi-quantitative mode is for purposes of enabling laboratories to determine an appropriate dilution of the specimen for confirmation by a confirmatory method such as Gas Chromatography/ Mass Spectrometry (GC-MS) or Liquid Chromatography/ Tandem Mass Spectrometry (LC-MS/MS) or permitting laboratories to establish quality control procedures. Clinical consideration and professional judgment should be applied to any drug-of-abuse test result, particularly when preliminary positive results are used.

3. Special conditions for use statement(s):

   Prescription use only.

   For In Vitro Diagnostic Use only.

4. Special instrument requirements:

   Atellica CH Analyzer

I. Device Description:

The Atellica CH Phencyclidine reagents are liquid, ready to use. There are two reagents packaged in two separate reagent packs. These include a reagent with antibodies to phencyclidine (polyclonal sheep) and glucose-6-phosphate. The second reagent is phencyclidine labeled with bacterial glucose-6-phosphate dehydrogenase.

The Atellica CH Analyzer has been previously cleared as part of the Trinidad CH System under k151767. The assay uses a previously cleared calibrator (k993755).

J. Substantial Equivalence Information:

1. Predicate device name(s):

   Siemens Urine phencyclidine (PCP) screen flex reagent cartridge

2. Predicate 510(k) number(s):

   k000462

3. Comparison with predicate:

Similarities/Differences		
Item	k163220 Atellica CH Phencyclidine (PCP) Candidate Device	k000462 Urine Phencyclidine (PCP) Screen Flex Reagent Cartridge Predicate Device
Intended Use:	Qualitative or semiquantitative analysis of phencyclidine (PCP) in human urine using the Atellica CH analyzer.	Qualitative or semiquantitative analysis of phencyclidine (PCP) in human urine using the Dimension clinical chemistry system.
Methodology:	Enzyme Immunoassay	Same
Type of Test:	Qualitative or semiquantitative	Same
Specimen Type:	Human urine	Same
Cutoff:	25 ng/mL	Same
Intended Users:	Prescription use only	Same
Calibration Frequency:	60 days	30 days

K. Standard/Guidance Document Referenced (if applicable):

The following guidelines from the Clinical and Laboratory Standards Institute (CLSI) were referenced:

EP05-A3. Evaluation of Precision Performance of Quantitative Measurement Methods, Approved Guideline; Third edition

EP07-A2. Interference Testing of Clinical Chemistry; Approved Guidelines

EP17-A2. Evaluation of Detection Capability for Clinical Laboratory Measurement Procedures, Approved Guideline, Second edition

EP25-A. Evaluation of Stability of In Vitro Diagnostic Reagents; Approved Guideline

L. Test Principle:

The Atellica CH PCP assay is a homogenous enzyme immunoassay based on competition between drug present in the specimen and drug labeled-glucose-6-phosphate dehydrogenase (PCP-G6PDH) for antibodies raised to PCP. PCP-G6PDH activity decreases upon binding to the anti-PCP antibodies and free PCP in the specimen competitively prevents this binding, so that PCP-G6PDH enzyme activity is proportional to drug concentration in the specimen. Active PCP-G6PDH enzyme converts nicotinamide adenine dinucleotide (NAD+) to NADH in the presence of glucose-6-phosphate, resulting in an absorbance change that is measured spectrophotometrically at 340/410 nm.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Precision study samples were prepared from negative urine samples spiked with nine different concentrations: +100%, +75% +50%, +25%, cut-off, -25%, -50%, -75% and -100% of the drug cutoff concentration (25 ng/mL) for PCP. Precision was tested using two replicates, two times a day for at least 20 days for a total of at least 80 replicates. The results in the qualitative mode and semi-quantitative mode are identical. The results are summarized below.

Urine Pool (ng/mL)	% of Cutoff	# of Results	Repeatability and Within-Laboratory Results
0	-100	80	80 Negative
6.25	-75	80	80 Negative
12.5	-50	80	80 Negative
18.75	-25	80	80 Negative
25	Cut-off	80	60 Positive / 20 Negative
31.25	25	80	80 Positive
37.5	50	80	80 Positive
43.75	75	80	80 Positive
50	100	80	80 Positive

b. Linearity/assay reportable range:

Urine samples were spiked with PCP concentrations ranging from 4.0 - 80.0 ng/mL. Seven replicates were processed in the same analytical run. For each known

concentration, drug recovery was calculated using the mean concentration of the replicates. The data support the semi-quantitative reportable range of 5 - 75 ng/mL. The data are summarized below.

Sample ID	Spiked PCP (ng/mL)	Mean PCP (ng/mL)	% Recovery
1	4.0	4.3	107.5
2	5.0	5.6	112.0
3	10.0	10.1	101.0
4	15.0	15.0	100.0
5	20.0	19.7	98.5
6	25.0	25.1	100.4
7	30.0	30.0	100.0
8	40.0	41.0	102.5
9	60.0	60.9	101.5
10	80.0	83.7	104.6

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

The assay uses previously cleared calibrators (k993755).

Reagent Stability:

A real time stability study to support a claim of 12 months shelf life is ongoing. Unopened reagents are stable until the expiration date on the product when stored at 2 - 8 °C. Reagents are stable onboard the system for 30 days.

Calibration Interval:

All protocols and acceptance criteria for Lot Calibration and Pack Calibration Intervals were reviewed and found to be acceptable. The study results support a calibration interval of 60 days and a pack calibration interval of 19 days.

d. Detection limit:

Not applicable.

e. Analytical specificity:

Cross-reactivity was evaluated by spiking the structurally similar compounds shown below into drug free urine. All samples were tested in replicates of N = 6. The results are summarized in the table below.

Compound	% Cross-Reactivity
1-(4-Hydroxypiperidino)phenylcyclohexane	5.97
1-(1-Phenylcyclohexyl)pyrrolidine	38.33
1-[1-(2-Thienyl)-cyclohexyl]piperidine	58.11
trans-4-phenyl-4-Piperidinocyclohexanol	74.38
Chlorpromazine	0.02
Clomipramine	0.02
Cyclobenzaprine	0.03
Dextromethorphan	0.02
Diphenhydramine	0.01
Doxepin	0.01
Imipramine	0.01
Methoxetamine	0.03
4- Methoxyphencyclidine	8.43
Thioridazine	0.04
Venlafaxine	0.01

Endogenous interferents were evaluated by spiking urine aliquots, with PCP concentrations at +/-25% of the cutoff, with endogenous interferents at the below indicated concentrations. No positive or negative interference was detected at the indicated concentrations.

Compound	Concentration Tested
Acetone	1.0 g/dL
Ascorbic Acid	0.75 g/dL
Conjugated bilirubin	0.25 mg/dL
Creatinine	0.5 g/dL
Ethanol	1.0 g/dL
Gamma Globulin	0.5 g/dL
Galactose	0.01 g/dL
Glucose	2.0 g/dL
Hemoglobin	115 mg/dL
Human Serum Albumin	0.5 g/dL

Oxalic Acid	0.1 g/dL
Riboflavin	7.5 mg/dL
Sodium Azide	1% (w/v)
Sodium Chloride	1.5 g/dL
Sodium Fluoride	1% (w/v)
Urea	6.0 g/dL

Structurally unrelated interferents were evaluated by spiking urine aliquots, with PCP with concentrations at +/-25% of the cutoff, with structurally unrelated interferents at the below indicated concentrations. No positive or negative interference was detected at the indicated concentrations.

Compound	**Concentration Tested (ng/mL)**
Acetaminophen	500,000
I-α-Acetylmethadol (LAAM)	25,000
N-Acetyl Procainamide (NAPA)	100,000
Acetylsalicylic Acid	500,000
Amitriptyline	8,750
S-(+)-Amphetamine	100,000
Benzoylecgonine	100,000
Buprenorphine	100,000
Caffeine	500,000
Cannabinol	100,000
Carbamazepine	100,000
Chlordiazepoxide	100,000
Cimetidine	100,000
Clonidine	100,000
Codeine	25,000
Cotinine	100,000
Desipramine	75,000
Dextrorphan	781
Diazepam	100,000
Digoxin	100,000
2-Ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP)	12,500
EMDP	100,000
1R,2S-Ephedrine	100,000
1S,2R-Ephedrine	100,000
Fluoxetine	75,000

Compound	Concentration Tested (ng/mL)
Flurazepam	50,000
Glutethimide	100,000
Haloperidol	100,000
Heroin	25,000
Hydrocodone	25,000
Ibuprofen	500,000
Ketamine	75,000
Ketorolac Tromethamine	100,000
Lidocaine	100,000
Lorazepam	100,000
Lormetazepam	100,000
LSD	100,000
MDMA	100,000
Meperidine	1,563
Methadone	50,000
S(+) - Methamphetamine	100,000
Methaqualone	100,000
Morphine	75,000
Naproxen	100,000
Nordiazepam	100,000
Nortriptyline	75,000
Oxazepam	100,000
Oxycodone	100,000
Phenobarbital	100,000
Phenylephrine	100,000
Phenytoin	100,000
Promethazine	3,125
Propoxyphene	100,000
Propranolol	100,000
Protriptyline	75,000
R,R - Pseudoephedrine	100,000
S,S - Pseudoephedrine	100,000
Ranitidine	100,000
Ritalinic Acid	100,000
Salicylic Acid	100,000
Scopolamine	100,000
Secobarbital	100,000
Tapentadol	50,000
11-nor-Δ9-THC-9-COOH	100,000
Tramadol	50,000
Trazodone	100,000
Tyramine	100,000

Compound	Concentration Tested (ng/mL)
Verapamil	60,000
Zidovudine (AZT)	100,000
Zolpidem	100,000

Boric acid 1% (w/v) results in a false negative result. The labeling states that boric acid not be used as a preservative for urine samples.

Effect of specific gravity: To evaluate the effect of specific gravity, the specific gravity of drug-free urine samples was adjusted with water or addition of creatinine to obtain the following values: 1.000, 1.002, 1.005, 1.010, 1.015, 1.020, 1.025, and 1.030. Specimens were spiked with PCP at ± 25% of the cutoff values. Six replicates of each specific gravity value and PCP concentration were performed. No positive or negative interference was detected with changes in specific gravity.

Effect of pH: To evaluate the effects of pH, drug-free urine was adjusted to 3.0 to 11.0 (+/- 0.2) in increments of 1 pH unit using 0.1N HCL or 0.1N NaOH. Urine pools were spiked with PCP at 25% below and 25% above the cutoff concentrations. Six replicates of each pH value and PCP concentration were analyzed. The pH ranges tested did not affect the results from the device.

f. Assay cut-off:

Characterization of how the device performs analytically around the claimed cutoff concentration appears in the precision section, M.1.a., above.

2. Comparison studies:

a. Method comparison with predicate device:

A total of 106, unaltered phencyclidine samples, and 6 altered samples (to achieve below cutoff levels), were analyzed using the Atellica CH PCP Assay and the reference method GC/MS. Results were obtained as positive or negative relative to the 25 ng/mL assay cutoff (qualitative mode) or in analyte units (semi-quantitative mode) on the Atellica CH. One replicate was processed for each sample. Twenty-eight samples were within +/- 50% of the cutoff by GC/MS. The results are summarized below by GC/MS and concordance agreement by Atellica CH Phencyclidine:

	GC/MS Results				
Atellica PCP	Neg (< 13 ng/mL)	Neg Within 50% below the cutoff (13 - 24 ng/mL)	Pos Within 50% above the cutoff (25 - 38 ng/mL)	Pos (> 38 ng/mL)	% Agreement
Qualitative					
Atellica Pos	0	1	17	36	98%
Atellica Neg	48	7	3	0	95%
Semi-Quantitative					
Atellica Pos	0	1	17	36	98%
Atellica Neg	48	7	3	0	95%

Discordant Samples between Atellica CH Phencyclidine and GC/MS:

Sample ID	Atellica Semi-quant. Value	GC/MS Value (ng/mL)	Atellica Pos/Neg	GC/MS Pos/Neg
53	25	23.7	Pos	Neg
57	23	25.3	Neg	Pos
59	23	28.2	Neg	Pos
61	22	30.0	Neg	Pos

b. Matrix comparison:

Not applicable

3. Clinical studies:

a. Clinical Sensitivity:

Not applicable

b. Clinical specificity:

Not applicable

c. Other clinical supportive data (when a. and b. are not applicable):

None

4. Clinical cut-off**:**

   Not applicable

5. Expected values/Reference range:

   Not applicable

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.