



March 21, 2019

Hangzhou Clongene Biotech Co.,Ltd.
% Joe Shia, Manager
LSI International
504 E Diamond Ave., Suite I
Gaithersburg, MD 20877

Re: k190412

Trade/Device Name: CLUNGENE Multi-Drug Test Dip Card
CLUNGENE Multi-Drug Test Easy Cup

Regulation Number: 21 CFR 862.3650

Regulation Name: Opiate test system

Regulatory Class: Class II

Product Codes: NGL, PTG, QBF

Dated: February 15, 2019

Received: February 21, 2019

Dear Joe Shia:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm> identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801 and Part 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see <https://www.fda.gov/CombinationProducts/GuidanceRegulatoryInformation/ucm597488.htm>); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to <http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm>.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (<https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/>) and CDRH Learn (<http://www.fda.gov/Training/CDRHLearn>). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (<http://www.fda.gov/DICE>) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,


Kellie B. Kelm -S

for Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

Indications for Use

510(k) Number (if known)

k190412

Device Name

CLUNGENE® Multi-Drug Test Dip Card

CLUNGENE® Multi-Drug Test Easy Cup

Indications for Use (Describe)

CLUNGENE® Multi-Drug Test Dip Card is competitive binding, lateral flow immunochromatographic assay for qualitative and simultaneous detection of Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Opiates, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine, Tricyclic Antidepressants, EDDP and Propoxyphene in human urine at the cutoff concentrations of:

Drug(Identifier)	Calibrator	Cut-off level
Amphetamine	d-Amphetamine	1000 ng/mL
Oxazepam	Oxazepam	300 ng/mL
Cocaine	Benzoyllecgonine	300 ng/mL
Marijuana	11-Nor- Δ^9 -Tetrahydrocannabinol-9-COOH	50 ng/mL
Methamphetamine	d-Methamphetamine	1000 ng/mL
Opiates	Morphine	2000 ng/mL
Oxycodone	Oxycodone	100 ng/mL
Secobarbital	Secobarbital	300 ng/mL
Methadone	Methadone	300 ng/mL
Buprenorphine	Buprenorphine	10 ng/mL
Methylenedioxymethamphetamine	D,L-Methylenedioxymethamphetamine	500 ng/mL
Phencyclidine	Phencyclidine	25 ng/mL
Tricyclic Antidepressants	Nortriptyline	1000 ng/mL
EDDP	2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine	300 ng/mL
Propoxyphene	d-Propoxyphene	300 ng/mL

Configuration of the CLUNGENE® Multi-Drug Test Dip Card can consist of any combination of the above listed drug analytes.

The test may yield positive results for the prescription drugs Buprenorphine, Oxazepam, Secobarbital, Nortriptyline, Propoxyphene and Oxycodone when taken at or above prescribed doses. It is not intended to distinguish between prescription use or abuse of these drugs. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary result is positive. The test provides only preliminary test results. A more specific alternative chemical method must be used in order to obtain a confirmed analytical result. GC/MS or LC/MS is the preferred confirmatory method.

For in vitro diagnostic use only.

CLUNGENE® Multi-Drug Test Easy Cup is competitive binding, lateral flow immunochromatographic assay for qualitative and simultaneous detection of Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Opiates, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine, Tricyclic Antidepressants, EDDP and Propoxyphene in human urine at the cutoff concentrations of:

Drug(Identifier)	Calibrator	Cut-off level
Amphetamine	d-Amphetamine	1000 ng/mL
Oxazepam	Oxazepam	300 ng/mL
Cocaine	Benzoyllecgonine	300 ng/mL
Marijuana	11-Nor- Δ^9 -Tetrahydrocannabinol-9-COOH	50 ng/mL

Methamphetamine	d-Methamphetamine	1000 ng/mL
Opiates	Morphine	2000 ng/mL
Oxycodone	Oxycodone	100 ng/mL
Secobarbital	Secobarbital	300 ng/mL
Methadone	Methadone	300 ng/mL
Buprenorphine	Buprenorphine	10 ng/mL
Methylenedioxymethamphetamine	D,L-Methylenedioxymethamphetamine	500 ng/mL
Phencyclidine	Phencyclidine	25 ng/mL
Tricyclic Antidepressants	Nortriptyline	1000 ng/mL
EDDP	2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine	300 ng/mL
Propoxyphene	d-Propoxyphene	300 ng/mL

Configuration of the CLUNGENE® Multi-Drug Test Easy Cup can consist of any combination of the above listed drug analytes.

The test may yield positive results for the prescription drugs Buprenorphine, Oxazepam, Secobarbital, Nortriptyline, Propoxyphene and Oxycodone when taken at or above prescribed doses. It is not intended to distinguish between prescription use or abuse of these drugs. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary result is positive. The test provides only preliminary test results. A more specific alternative chemical method must be used in order to obtain a confirmed analytical result. GC/MS or LC/MS is the preferred confirmatory method.

For in vitro diagnostic use only.

Type of Use (Select one or both, as applicable)

☐ Prescription Use (Part 21 CFR 801 Subpart D)

☒ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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K190412
510(k) SUMMARY

The purpose of this submission is to add analytes 2-ethylidene-1, 5-dimethyl-3, 3-diphenylpyrrolidine, Opiates and Propoxyphene to previously cleared device (k181790). These three new analytes were evaluated in this submission. For other analytes, please refer to k153741 for Methamphetamine, Morphine and Cannabinoids, and to k161251 for Amphetamine, Cocaine and Oxazepam, and to k180255 for Secobarbital, Methadone and Oxycodone, and k181790 for Methylenedioxymethamphetamine, Buprenorphine, Phencyclidine and Nortriptyline. In this submission the performance results are presented for the three new analytes, but the lay user study was conducted using the entire panel.

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2. Submitter: Hangzhou Clongene Biotech Co., Ltd.
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3. Contact person: Joe Shia
LSI International Inc
504E Diamond Ave., Suite J
Gaithersburg, MD 20877
Telephone: 240-505-7880
Email: shiajl@yahoo.com.
4. Device Name: CLUNGENE Multi-Drug Test Dip Card
CLUNGENE Multi-Drug Test Easy Cup

Classification: Class 2

Product Code	Classification	Regulation Section	Panel
NGL Morphine	II	21 CFR § 862.3650, Opiate Test System	Toxicology (91)
PTG 2-ethylidene-1, 5- dimethyl-3, 3- diphenylpyrrolidine	II	21 CFR § 862.3620, Methadone Test System	Toxicology (91)
QBF Propoxyphene	II	21 CFR, 862.3700 Propoxyphene Test System	Toxicology (91)

5. Predicate Devices: K180349

The Assure Tech Panel Dip Tests/AssureTech Quick Cup Tests

6. Intended Use

CLUNGENE® Multi-Drug Test Dip Card is competitive binding, lateral flow immunochromatographic assay for qualitative and simultaneous detection of Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Opiates Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine, Tricyclic Antidepressants, EDDP and Propoxyphene in human urine at the cutoff concentrations of:

Drug	Calibrator	Cut-off
Amphetamine	d-Amphetamine	1000 ng/mL
Secobarbital	Secobarbital	300 ng/mL
Oxazepam	Oxazepam	300 ng/mL
Cocaine	Benzoyllecgonine	300 ng/mL
Methamphetamine	d-Methamphetamine	1000 ng/mL
Opiates	Morphine	2000 ng/mL
Methadone	Methadone	300 ng/mL
Oxycodone	Oxycodone	100 ng/mL
Marijuana	11-Nor- Δ^9 -Tetrahydrocannabinol-9 COOH	50 ng/mL
Buprenorphine	Buprenorphine	10 ng/mL
Methylenedioxymethamphetamine	D,L-Methylenedioxymethamphetamine	500 ng/mL
Phencyclidine	Phencyclidine	25 ng/mL
Tricyclic Antidepressants	Nortriptyline	1000 ng/mL
EDDP	(2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine)	300 ng/mL
Propoxyphene	d-Propoxyphene	300 ng/mL

Configuration of the CLUNGENE® Multi-Drug Test Dip Card can consist of any combination of the above listed drug analytes.

The test may yield positive results for the prescription drugs Buprenorphine, Oxazepam, Secobarbital, Nortriptyline, Propoxyphene and Oxycodone when taken at or above prescribed doses. It is not intended to distinguish between prescription use or abuse of these drugs. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary result is positive. The test provides only preliminary test results. A more specific alternative chemical method must be used in order to obtain a confirmed analytical result. GC/MS or LC/MS is the preferred confirmatory method.

For in vitro diagnostic use only.

CLUNGENE® Multi-Drug Test Easy Cup is competitive binding, lateral flow immunochromatographic assay for qualitative and simultaneous detection of Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Opiates, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine, Tricyclic Antidepressants, EDDP and Propoxyphene in human urine at the cutoff concentrations of:

Drug	Calibrator	Cut-off
Amphetamine	d-Amphetamine	1000 ng/mL
Secobarbital	Secobarbital	300 ng/mL
Oxazepam	Oxazepam	300 ng/mL
Cocaine	Benzoyllecgonine	300 ng/mL
Methamphetamine	d-Methamphetamine	1000 ng/mL
Opiates	Morphine	2000 ng/mL
Methadone	Methadone	300 ng/mL
Oxycodone	Oxycodone	100 ng/mL
Marijuana	11-Nor- Δ^9 -Tetrahydrocannabinol-9 COOH	50 ng/mL
Buprenorphine	Buprenorphine	10 ng/mL
Methylenedioxymethamphetamine	D,L-Methylenedioxymethamphetamine	500 ng/mL

Phencyclidine	Phencyclidine	25 ng/mL
Tricyclic Antidepressants	Nortriptyline	1000 ng/mL
EDDP	(2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine)	300 ng/mL
Propoxyphene	d-Propoxyphene	300 ng/mL

Configuration of the CLUNGENE® Multi-Drug Test Easy Cup can consist of any combination of the above listed drug analytes.

The test may yield positive results for the prescription drugs Buprenorphine, Oxazepam, Secobarbital, Nortriptyline, Propoxyphene and Oxycodone when taken at or above prescribed doses. It is not intended to distinguish between prescription use or abuse of these drugs. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary result is positive. The test provides only preliminary test results. A more specific alternative chemical method must be used in order to obtain a confirmed analytical result. GC/MS or LC/MS is the preferred confirmatory method.

For in vitro diagnostic use only.

7. Device Description

The CLUNGENE Multi-Drug Test Dip Card and CLUNGENE Multi-Drug Test Easy Cup are immunochromatographic assays that use a lateral flow system for the qualitative detection of Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Morphine, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine, Tricyclic Antidepressants, EDDP and Propoxyphene (target analytes) in human urine. The products are single-use in vitro diagnostic devices. The CLUNGENE Multi-Drug Test Dip Card kit contains a Dip Card device, a package insert and a urine cup for sample collection. The CLUNGENE Multi-Drug Test Easy Cup kit contains a Cup device, a package insert and a urine cup for sample collection. Each test device is sealed with a desiccant in an aluminum pouch.

8. Substantial Equivalence Information

A summary comparison of features of the CLUNGENE Multi-Drug Test Dip Card and CLUNGENE Multi-Drug Test Easy Cup and the predicate devices is provided in following tables.

Table 1: Features Comparison of CLUNGENE Multi-Drug Test Dip Card and the Predicate Devices

Item	Device	Predicate - K180349
Indication(s) for Use	For the qualitative determination of drugs of abuse in human urine.	Same (but the number of drugs detected is different)

Calibrator and Cut-Off Values	Amphetamine (AMP): 1,000 ng/ml Oxazepam (BZO):300 ng/ml Cocaine(COC): 300 ng/ml 11-Nor- Δ^9 -Tetrahydrocannabinol-9-COOH (THC):50 ng/ml Methamphetamine (MET): 1,000 ng/ml Morphine (MOR): 2000ng/mL Oxycodone(OXY) : 100 ng/ml Secobarbital (BAR): 300 ng/ml Methadone (MTD): 300 ng/ml Buprenorphine (BUP): 10 ng/ml D,L-Methylenedioxymethamphetamine (MDMA): 500 ng/ml Phencyclidine (PCP): 25 ng/ml Nortriptyline (TCA): 1000 ng/ml 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP): 300 ng/ml Propoxyphene (PPX): 300 ng/ml	Same
Methodology	Competitive binding, lateral flow immunochromatographic assays based on the principle of antigen antibody immunochemistry.	Same
Type of Test	Qualitative	Same
Specimen Type	Human Urine	Same
Intended Use	For over-the-counter	Same
Configurations	Dip Card	Same

Table 2: Features Comparison of CLUNGENE Multi-Drug Test Easy Cup Tests and the Predicate Devices

Item	Device	Predicate - K180349
Indication(s) for Use	For the qualitative determination of drugs of abuse in human urine.	Same (but the number of drugs detected is different)
Calibrator and Cut-Off Values	Amphetamine (AMP): 1,000 ng/ml Oxazepam (BZO):300 ng/ml Cocaine(COC): 300 ng/ml 11-Nor- Δ^9 -Tetrahydrocannabinol-9-COOH (THC):50 ng/ml Methamphetamine (MET): 1,000 ng/ml Morphine (MOR): 300ng/mL Oxycodone(OXY) : 100 ng/ml Secobarbital (BAR): 300 ng/ml Methadone (MTD): 300 ng/ml Buprenorphine (BUP): 10 ng/ml	Same

	D,L-Methylenedioxymethamphetamine (MDMA): 500 ng/ml Phencyclidine (PCP): 25 ng/ml Nortriptyline (TCA): 1000 ng/ml 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP): 300 ng/ml Propoxyphene (PPX): 300 ng/ml	
Methodology	Competitive binding, lateral flow immunochromatographic assays based on the principle of antigen antibody immunochemistry.	Same
Type of Test	Qualitative	Same
Specimen Type	Human Urine	Same
Intended Use	For over-the-counter	Same
Configurations	Cup	Dip Card

9. Test Principle

The CLUNGENE Multi-Drug Test Dip Card, and CLUNGENE Multi-Drug Test Easy Cup are rapid tests for the qualitative detection of Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Morphine, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine, Tricyclic Antidepressants, 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine and Propoxyphene in urine samples. The tests are lateral flow chromatographic immunoassays. During testing, a urine specimen migrates upward by capillary action. If target drugs present in the urine specimen are below the cut-off concentration, it will not saturate the binding sites of its specific monoclonal mouse antibody coated on the particles. The antibody-coated particles will then be captured by immobilized drug-conjugate and a visible colored line will show up in the test line region. The colored line will not form in the test line region if the target drug level exceeds its cutoff-concentration because it will saturate all the binding sites of the antibody coated on the particles. A band should form in the control region of the devices regardless of the presence of drug or metabolite in the sample to indicate that the tests have been performed properly.

10. Performance Characteristics

1. Analytical Performance

a. Precision

Precision studies were carried out for samples with concentrations of -100% cut off, -75% cut off, -50% cut off, -25% cut off, cut off, +25% cut off, +50% cut off, +75% cut off and +100% cut off. These samples were prepared by spiking drug in negative urine samples. Each drug concentration was confirmed by LC/MS. All sample aliquots were blindly labeled by the person who prepared the samples and didn't take part in the sample testing. For each concentration, tests were performed two runs per day for 25 days per device in a randomized order. The results obtained are summarized in the following tables for 2-ethylidene-1, 5-dimethyl-3, 3-diphenylpyrrolidine, Opiates and Propoxyphene. The data for Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Oxycodone, Secobarbital, Methadone, Buprenorphine,

Phencyclidine, Methylenedioxymethamphetamine and Tricyclic Antidepressants were reported in k181790.

EDDP

CLUNGENE Multi-Drug Test Dip Card

Concentration by LC/MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	Cut-off +25%	Cut-off +50%	Cut-off +75%	Cut-off +100%
Lot Number	0	71.50	143.83	217.20	298.13	353.33	461.00	515.53	618.63
Lot 1	50-/0+	50-/0+	50-/0+	50-/0+	27-/23+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 2	50-/0+	50-/0+	50-/0+	50-/0+	25-/25+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 3	50-/0+	50-/0+	50-/0+	50-/0+	27-/23+	50+/0-	50+/0-	50+/0-	50+/0-

CLUNGENE Multi-Drug Test Easy Cup

Concentration by LC/ MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	Cut-off +25%	Cut-off +50%	Cut-off +75%	Cut-off +100%
Lot Number	0	71.50	143.83	217.20	298.13	353.33	461.00	515.53	618.63
Lot 1	50-/0+	50-/0+	50-/0+	50-/0+	26-/24+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 2	50-/0+	50-/0+	50-/0+	50-/0+	26-/24+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 3	50-/0+	50-/0+	50-/0+	50-/0+	27-/23+	50+/0-	50+/0-	50+/0-	50+/0-

Opiates

CLUNGENE Multi-Drug Test Dip Card

Concentration by LC/MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	+25% Cut-off	+50% Cut-off	+75% Cut-off	+100% Cut-off
Lot Number	0	492.7	985.7	1394.0	1941.8	2433.2	2876.9	3519.6	3873.9
Lot 1	50-/0+	50-/0+	50-/0+	50-/0+	26-/24+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 2	50-/0+	50-/0+	50-/0+	50-/0+	27-/23+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 3	50-/0+	50-/0+	50-/0+	50-/0+	26-/24+	50+/0-	50+/0-	50+/0-	50+/0-

CLUNGENE Multi-Drug Test Easy Cup

Concentration by LC/MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	+25% Cut-off	+50% Cut-off	+75% Cut-off	+100% Cut-off
Lot Number	0	492.7	985.7	1394.0	1941.8	2433.2	2876.9	3519.6	3873.9
Lot 1	50-/0+	50-/0+	50-/0+	50-/0+	27-/23+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 2	50-/0+	50-/0+	50-/0+	50-/0+	26-/24+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 3	50-/0+	50-/0+	50-/0+	50-/0+	25-/25+	50+/0-	50+/0-	50+/0-	50+/0-

Propoxyphene

CLUNGENE Multi-Drug Test Dip Card

Concentration by LC/MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	+25% Cut-off	+50% Cut-off	+75% Cut-off	+100% Cut-off
Lot Number	0	75.48	153.63	222.68	296.13	372.90	464.60	501.28	588.43
Lot 1	50-/0+	50-/0+	50-/0+	50-/0+	25-/25+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 2	50-/0+	50-/0+	50-/0+	50-/0+	26-/24+	50+/0-	50+/0-	50+/0-	50+/0-

Concentration by LC/MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	+25% Cut-off	+50% Cut-off	+75% Cut-off	+100% Cut-off
Lot Number	0	75.48	153.63	222.68	296.13	372.90	464.60	501.28	588.43
Lot 3	50-/0+	50-/0+	50-/0+	50-/0+	24-/26+	50+/0-	50+/0-	50+/0-	50+/0-

CLUNGENE Multi-Drug Test Easy Cup

Concentration by LC/MS (ng/mL)	-100% Cut-off	-75% Cut-off	-50% Cut-off	-25% Cut-off	Cut-off	+25% Cut-off	+50% Cut-off	+75% Cut-off	+100% Cut-off
Lot Number	0	75.48	153.63	222.68	296.13	372.90	464.60	501.28	588.43
Lot 1	50-/0+	50-/0+	50-/0+	50-/0+	24-/26+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 2	50-/0+	50-/0+	50-/0+	50-/0+	27-/23+	50+/0-	50+/0-	50+/0-	50+/0-
Lot 3	50-/0+	50-/0+	50-/0+	50-/0+	24-/26+	50+/0-	50+/0-	50+/0-	50+/0-

The following cut-off values are verified.

Drug (Identifier)	Cut-off level
2-ethylidene-1, 5-dimethyl-3, 3-diphenylpyrrolidine (EDDP)	300 ng/mL
Opiates (OPI)	2000 ng/mL
Propoxyphene (PPX)	300 ng/mL

b. Linearity

Not applicable.

c. Stability

The devices are stable at 4-30 °C for 24 months based on the accelerated stability study at 45 °C. Real time stability studies are ongoing.

d. Interference

Potential interfering substances found in human urine of physiological or pathological conditions were added to drug-free urine and target drugs urine with concentrations at 25% below and 25% above Cut-Off levels. These urine samples were tested using three lots of each device. Compounds that showed no interference at a concentration of 100µg/mL are summarized in the following tables. There were no differences observed between the CLUNGENE Multi-Drug Test Dip Card and CLUNGENE Multi-Drug Test Easy Cup.

Acetaminophen	β-Estradiol	Oxalic acid
Acetophenetidin	Erythromycin	Oxolinic acid
N-Acetylprocainamide	Fenoprofen	Oxymetazoline
Acetylsalicylic acid	Furosemide	Papaverine
Albumin	Gentisic acid	Penicillin G
Aminopyrine	Hemoglobin	Perphenazine
Amoxicillin	Hydralazine	Phenelzine
Ampicillin	Hydrochlorothiazide	Prednisone
Apomorphine	Hydrocortisone	(±)-Propranolol
Ascorbic acid	O-Hydroxyhippuric acid	Pseudoephedrine
Aspartame	3-Hydroxytyramine	Quinine

Atropine	Ibuprofen	Ranitidine
Benzilic acid	Isoproterenol	Salicylic acid
Benzoic acid	Isoxsuprine	Serotonin (5- Hydroxytyramine)
Bilirubin	Ketamine	Sulfamethazine
Chloral hydrate	Ketoprofen	Sulindac
Chloramphenicol	Labetalol	Tetrahydrocortisone 3-(β-Dglucuronide)
Chlorothiazide	Loperamide	Tetrahydrocortisone 3-acetate
Chlorpromazine	Meperidine	Tetrahydrozoline
Cholesterol	Meprobamate	Thiamine
Clonidine	Methoxyphenamine	Thioridazine
Cortisone	Nalidixic acid	Triamterene
(-)-Cotinine	Naloxone	Trifluoperazine
Creatinine	Naltrexone	Trimethoprim
Deoxycorticosterone	Naproxen	DL-Tryptophan
Dextromethorphan	Niacinamide	Tyramine
Diclofenac	Nifedipine	DL-Tyrosine
Diflunisal	Norethindrone	Uric acid
Digoxin	Noscapine	Verapamil
Diphenhydramine	(±)-Octopamine	Zomepirac
Ecgonine methyl ester		

e. Specificity

To test specificity, drug metabolites and other structurally related compounds that are likely to cross-react in urine samples were spiked into negative urine and were tested using three lots of each device. The lowest concentration that caused a positive result for each compound are listed below for 2-ethylidene-1, 5-dimethyl-3, 3-diphenylpyrrolidine, Opiates and Propoxyphene. The data for Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine and Tricyclic Antidepressants were reported in k181790. There were no differences observed between the CLUNGENE Multi-Drug Test Dip Card and CLUNGENE Multi-Drug Test Easy Cup.

EDDP (Cut-off=300 ng/mL)	Result Positive at (ng/ml)	% Cross-Reactivity
EDDP (2-ethylidene-1,5-Dimethyl-3,3-diphenylpyrrolidine)	300	100%
Disopyramide	75000	0.4%
Doxylamine	75000	0.4%
LAAM (Levo-alpha-acetylmethadol)	>100000	<0.3%
Alpha Methadol	>100000	<0.3%
Methadone	>100000	<0.3%
EMDP (2-Ethyl-5-methyl-3,3-diphenylpyrrolidine)	>100000	<0.3%

Opiate (Cut-off=2000 ng/mL)	Result Positive at(ng/ml)	% Cross-Reactivity
Morphine	2,000	100%
O ⁶ -Acetylmorphine	2,000	100%
Codeine	2,000	100%

EthylMorphine	20,000	10%
Heroin	2,000	100%
Hydromorphone	10,000	20%
Levorphanol	5,000	40%
Oxycodone	100,000	2%
Procaine	50,000	4%
Thebaine	20,000	10%

Propoxyphene (Cut-off=300 ng/mL)	Result Positive at(ng/ml)	% Cross-Reactivity
d-Propoxyphene	300	100%
Norpropoxyphene	300	100%

f. Effect of Urine Specific Gravity and Urine pH

To investigate the effect of urine specific gravity and urine pH, urine samples, with 1.000 to 1.035 specific gravity or urine samples with pH 4 to 9 were spiked with target drugs at 25% below and 25% above Cut-Off levels. These samples were tested using three lots of each device. Results were all positive for samples at and above +25% Cut-Off and all negative for samples at and below -25% Cut-Off. There were no differences observed between the CLUNGENE Multi-Drug Test Dip Card and CLUNGENE Multi-Drug Test Easy Cup.

2. Comparison Studies

Method comparison studies for the CLUNGENE Multi-Drug Test Dip Card and the CLUNGENE Multi-Drug Test Easy Cup were performed in-house with three laboratory assistants for each device. Operators ran 80 (40 negative and 40 positive) unaltered clinical samples for each drug. The samples were blind labeled and compared to LC/MS results. The results are presented in the tables below for 2-ethylidene-1, 5-dimethyl-3, 3-diphenylpyrrolidine, Opiates and Propoxyphene. The data for Amphetamine, Oxazepam, Cocaine, Marijuana, Methamphetamine, Oxycodone, Secobarbital, Methadone, Buprenorphine, Phencyclidine, Methylenedioxymethamphetamine and Tricyclic Antidepressants were reported in k181790.

EDDP

CLUNGENE Multi-Drug Test Dip Card		Negative	Low Negative by LC/MS (less than -50%)	Near Cutoff Negative by LC/MS (Between -50% and cutoff)	Near Cutoff Positive by LC/MS (Between the cutoff and +50%)	High Positive by LC/MS (greater than +50%)
Viewer A	Positive	0	0	1	19	20
	Negative	10	15	14	1	0
Viewer B	Positive	0	0	1	20	20
	Negative	10	15	14	0	0
Viewer C	Positive	0	0	0	19	20
	Negative	10	15	15	1	0

Discordant Results

Viewer	Sample Number	LC/MS Result	Dip Card Viewer Results
Viewer A	EDDP10	285.53	Positive

Viewer B	EDDP98	284.15	Positive
Viewer A	EDDP39	318.03	Negative
Viewer C	EDDP39	318.03	Negative

CLUNGENE Multi-Drug Test Easy Cup		Negative	Low Negative by LC/MS (less than -50%)	Near Cutoff Negative by LC/MS (Between -50% and cutoff)	Near Cutoff Positive by LC/MS (Between the cutoff and +50%)	High Positive by LC/MS (greater than +50%)
Viewer A	Positive	0	0	1	19	20
	Negative	10	15	14	1	0
Viewer B	Positive	0	0	0	19	20
	Negative	10	15	15	1	0
Viewer C	Positive	0	0	1	19	20
	Negative	10	15	14	1	0

Discordant Results

Viewer	Sample Number	LC/MS Result	Easy Cup Viewer Results
Viewer A	EDDP98	284.15	Positive
Viewer C	EDDP10	285.53	Positive
Viewer A	EDDP39	318.03	Negative
Viewer B	EDDP07	330.83	Negative
Viewer C	EDDP39	318.03	Negative

Opiates

CLUNGENE Multi-Drug Test Dip Card		Negative	Low Negative by LC/MS (less than -50%)	Near Cutoff Negative by LC/MS (Between -50% and cutoff)	Near Cutoff Positive by LC/MS (Between the cutoff and +50%)	High Positive by LC/MS (greater than +50%)
Viewer A	Positive	0	0	2	19	20
	Negative	10	15	13	1	0
Viewer B	Positive	0	0	1	18	20
	Negative	10	15	14	2	0
Viewer C	Positive	0	0	1	19	20
	Negative	10	15	14	1	0

Discordant Results

Viewer	Sample Number	LC/MS Result	Dip Card Viewer Results
Viewer A	OPI35	1978.6	Positive
Viewer A	OPI51	1924.8	Positive
Viewer B	OPI51	1924.8	Positive
Viewer C	OPI35	1978.6	Positive

Viewer A	OPI66	2010.4	Negative
Viewer B	OPI66	2010.4	Negative
Viewer B	OPI57	2087.1	Negative
Viewer C	OPI57	2087.1	Negative

CLUNGENE Multi-Drug Test Easy Cup		Negative	Low Negative by LC/MS (less than -50%)	Near Cutoff Negative by LC/MS (Between -50% and cutoff)	Near Cutoff Positive by LC/MS (Between the cutoff and +50%)	High Positive by LC/MS (greater than +50%)
Viewer A	Positive	0	0	2	18	20
	Negative	10	15	13	2	0
Viewer B	Positive	0	0	1	19	20
	Negative	10	15	14	1	0
Viewer C	Positive	0	0	2	18	20
	Negative	10	15	13	2	0

Discordant Results

Viewer	Sample Number	LC/MS Result	Easy Cup Viewer Results
Viewer A	OPI35	1978.6	Positive
Viewer A	OPI51	1924.8	Positive
Viewer B	OPI51	1924.8	Positive
Viewer C	OPI51	1924.8	Positive
Viewer C	OPI35	1978.6	Positive
Viewer A	OPI56	2061.2	Negative
Viewer A	OPI66	2010.4	Negative
Viewer B	OPI57	2087.1	Negative
Viewer C	OPI56	2061.2	Negative
Viewer C	OPI66	2010.4	Negative

Propoxyphene

CLUNGENE Multi-Drug Test Dip Card		Negative	Low Negative by LC/MS (less than -50%)	Near Cutoff Negative by LC/MS (Between -50% and cutoff)	Near Cutoff Positive by LC/MS (Between the cutoff and +50%)	High Positive by LC/MS (greater than +50%)
Viewer A	Positive	0	0	1	19	20
	Negative	10	15	14	1	0
Viewer B	Positive	0	0	1	19	20
	Negative	10	15	14	1	0
Viewer C	Positive	0	0	0	19	20
	Negative	10	15	15	1	0

Discordant Results

Viewer	Sample Number	LC/MS Result	Dip Card Viewer Results
Viewer A	PPX22	292.00	Positive
Viewer B	PPX22	292.00	Positive
Viewer A	PPX59	322.25	Negative
Viewer B	PPX62	334.73	Negative
Viewer C	PPX59	322.25	Negative

CLUNGENE Multi-Drug Test Easy Cup		Negative	Low Negative by LC/MS (less than -50%)	Near Cutoff Negative by LC/MS (Between -50% and cutoff)	Near Cutoff Positive by LC/MS (Between the cutoff and +50%)	High Positive by LC/MS (greater than +50%)
Viewer A	Positive	0	0	1	19	20
	Negative	10	15	14	1	0
Viewer B	Positive	0	0	0	18	20
	Negative	10	15	15	2	0
Viewer C	Positive	0	0	1	19	20
	Negative	10	15	14	1	0

Discordant Results

Viewer	Sample Number	LC/MS Result	Easy Cup Viewer Results
Viewer A	PPX22	292.00	Positive
Viewer C	PPX22	292.00	Positive
Viewer A	PPX59	322.25	Negative
Viewer B	PPX59	322.25	Negative
Viewer C	PPX59	322.25	Negative
Viewer B	PPX62	334.73	Negative

Lay-user study

A lay user study was performed at three intended user sites with 310 lay persons for each device format. The lay users had diverse educational and professional backgrounds and ranged in age from 18 to > 50 years. Urine samples were prepared at the following concentrations; negative, +/-75%, +/-50%, +/-25% of the cutoff by spiking drugs into drug free-pooled urine specimens. The concentrations of the samples were confirmed by LC/MS. Each sample was aliquoted into individual containers and blind-labeled. Each participant was provided with the package insert, 1 blind labeled sample and a device. Each device was tested. Typical Results are shown below.

CLUNGENE Multi-Drug Test

Drugs	% of Cut-off	Number of samples	Concentration by LC/MS (ng/mL)	Lay person results		The percentage of correct results (%)
				No. of Positive	No. of Negative	
AMP	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	250	0	20	100
	-50% Cut-off	170	500	0	170	100

	-25% Cut-off	20	750	1	19	95
	+25% Cut-off	20	1250	19	1	95
	+50% Cut-off	40	1500	40	0	100
	+75% Cut-off	20	1750	20	0	100
BAR	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	75	0	20	100
	-50% Cut-off	170	150	0	170	100
	-25% Cut-off	20	225	0	20	100
	+25% Cut-off	20	375	18	2	90
	+50% Cut-off	40	450	40	0	100
	+75% Cut-off	20	525	20	0	100
COC	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	75	0	20	100
	-50% Cut-off	170	150	0	170	100
	-25% Cut-off	20	225	1	19	95
	+25% Cut-off	20	375	19	1	95
	+50% Cut-off	40	450	40	0	100
	+75% Cut-off	20	525	20	0	100
BZO	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	75	0	20	100
	-50% Cut-off	170	150	0	170	100
	-25% Cut-off	20	225	0	20	100
	+25% Cut-off	20	375	19	1	95
	+50% Cut-off	40	450	40	0	100
	+75% Cut-off	20	525	20	0	100
MET	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	250	0	20	100
	-50% Cut-off	170	500	0	170	100
	-25% Cut-off	20	750	1	19	95
	+25% Cut-off	20	1250	19	1	95
	+50% Cut-off	40	1500	40	0	100
	+75% Cut-off	20	1750	20	0	100
MTD	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	75	0	20	100
	-50% Cut-off	170	150	0	170	100
	-25% Cut-off	20	225	0	20	100
	+25% Cut-off	20	375	19	1	95
	+50% Cut-off	40	450	40	0	100
	+75% Cut-off	20	525	20	0	100
OPI	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	500	0	20	100
	-50% Cut-off	170	1000	0	170	100
	-25% Cut-off	20	1500	1	19	95
	+25% Cut-off	20	2500	20	0	100
	+50% Cut-off	40	3000	40	0	100
	+75% Cut-off	20	3500	20	0	100
OXY	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	25	0	20	100
	-50% Cut-off	170	50	0	170	100
	-25% Cut-off	20	75	1	19	95
	+25% Cut-off	20	125	19	1	95
	+50% Cut-off	40	150	40	0	100

	+75% Cut-off	20	175	20	0	100
THC	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	12.5	0	20	100
	-50% Cut-off	170	25	0	170	100
	-25% Cut-off	20	37.5	0	20	100
	+25% Cut-off	20	62.5	19	1	95
	+50% Cut-off	40	75	40	0	100
	+75% Cut-off	20	87.5	20	0	100
TCA	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	250	0	20	100
	-50% Cut-off	170	500	0	170	100
	-25% Cut-off	20	750	1	19	95
	+25% Cut-off	20	1250	19	1	95
	+50% Cut-off	40	1500	40	0	100
	+75% Cut-off	20	1750	20	0	100
BUP	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	2.5	0	20	100
	-50% Cut-off	170	5	0	170	100
	-25% Cut-off	20	7.5	1	19	95
	+25% Cut-off	20	12.5	19	1	95
	+50% Cut-off	40	15	40	0	100
	+75% Cut-off	20	17.5	20	0	100
PCP	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	6.25	0	20	100
	-50% Cut-off	170	12.5	0	170	100
	-25% Cut-off	20	18.75	1	19	95
	+25% Cut-off	20	31.25	20	0	100
	+50% Cut-off	40	37.5	40	0	100
	+75% Cut-off	20	43.75	20	0	100
MDMA	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	125	0	20	100
	-50% Cut-off	170	250	0	170	100
	-25% Cut-off	20	375	0	20	100
	+25% Cut-off	20	625	19	1	95
	+50% Cut-off	40	750	40	0	100
	+75% Cut-off	20	875	20	0	100
EDDP	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	75	0	20	100
	-50% Cut-off	170	150	0	170	100
	-25% Cut-off	20	225	1	19	95
	+25% Cut-off	20	375	19	1	95
	+50% Cut-off	40	450	40	0	100
	+75% Cut-off	20	525	20	0	100
PPX	-100% Cut-off	20	0	0	20	100
	-75% Cut-off	20	75	0	20	100
	-50% Cut-off	170	150	0	170	100
	-25% Cut-off	20	225	0	20	100
	+25% Cut-off	20	375	19	1	95
	+50% Cut-off	40	450	40	0	100

	+75% Cut-off	20	525	20	0	100
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Lay-users were also given surveys on the ease of understanding the package insert instructions. All lay users indicated that the device instructions can be easily followed. A Flesch-Kincaid reading analysis was performed on each package insert and the scores revealed a reading Grade Level of 7.

3. Clinical Studies

Not applicable.

11. Conclusion

Based on the test principle and acceptable performance characteristics including precision, cut-off, interference, specificity, method comparison, and lay-user studies of the devices, it's concluded that the CLUNGENE Multi-Drug Test Dip Card and CLUNGENE Multi-Drug Test Easy Cup are substantially equivalent to the predicate.