510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY

I Background Information:

A 510(k) Number

K240295

B Applicant

Instanosis Inc

C Proprietary and Established Names

InstaStrip Fentanyl Rapid Test (Urine); InstaStrip Fentanyl Dipstick Test (Urine)

D Regulatory Information

Product Code(s)	Classification	Regulation Section	Panel
NGL	Class II	21 CFR 862.3650 - Opiate Test System	TX - Clinical Toxicology

II Submission/Device Overview:

A Purpose for Submission:

New device

B Measurand:

Fentanyl

C Type of Test:

Qualitative

III Intended Use/Indications for Use:

A Intended Use(s):
See Indications for Use below.

B Indication(s) for Use:
InstaStrip Fentanyl Rapid Test (Urine) is intended for the qualitative detection of fentanyl in human urine at the cutoff value of 1.0 ng/mL. The test is intended for over-the-counter (OTC) use.

The assay provides only a preliminary analytical result. A more specific alternative chemical method (e.g., gas or liquid chromatography and mass spectrometry) must be used in order to obtain a confirmed analytical result. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.

The InstaStrip Fentanyl Dipstick Test (Urine) is intended for the qualitative detection of fentanyl in human urine at the cutoff value of 1.0 ng/mL.

The assay provides only a preliminary analytical result. A more specific alternative chemical method (e.g., gas or liquid chromatography and mass spectrometry) must be used in order to obtain a confirmed analytical result. Clinical consideration and professional judgment should be exercised with any drug of abuse test result, particularly when the preliminary test result is positive.

C Special Conditions for Use Statement(s):
OTC - Over The Counter

D Special Instrument Requirements:

Not applicable.

IV Device/System Characteristics:

A Device Description:

InstaStrip Fentanyl Rapid Test (Urine) and InstaStrip Fentanyl Dipstick Test (Urine) are an immunoassay technique that is based on competitive lateral flow immunoassay intended for the qualitative detection of fentanyl in human urine. The candidate devices consist of a urine cup, test tube, dropper, test strip, tube stand, and package insert. Each test strip is sealed with sachets of desiccant in an aluminum pouch.

B Principle of Operation:

The urine sample is added to a provided test tube containing dried rabbit monoclonal antibody-gold nanoparticle (Ab-AuNP) conjugates. The test tube is shaken until the Ab-AuNP pellet is dissolved and the sample turns pink. The test strip is then inserted into the test tube and the user caps the test tube. The pre-immobilized fentanyl-BSA on the test line competes with fentanyl in the urine sample for binding to the Ab-AuNPs. The device is designed so that when the fentanyl concentration in the urine sample exceeds 1 ng/mL, the test line is no longer visible. The test line

will be visible and the result is negative when the fentanyl concentration in the urine sample is less than 1 ng/mL. No matter whether the sample contains the corresponding analyte or not, the quality control area (C) will develop a colored line, which is the criteria for judging whether the chromatography process is normal or not.

V Substantial Equivalence Information:

A Predicate Device Name(s):
AllTest Fentanyl Urine Test Cassette

B Predicate 510(k) Number(s):
K233417

C Comparison with Predicate(s):

Device & Predicate Device(s):	K240295	K233417
Device Trade Name	InstaStrip Fentanyl Rapid Test (Urine) and InstaStrip Fentanyl Dipstick Test (Urine)	AllTest Fentanyl Rapid Test (Urine)
General Device Characteristic Similarities		
Indications For Use	For the qualitative detection of fentanyl in human urine.	Same
Calibrator and Cut-off Values	Fentanyl (FTY) 1 ng/mL	Same
Methodology	Competitive binding, lateral flow immunochromatographic assays based on the principle of antigen antibody immunochemistry.	Same
Test Type	Qualitative	Same
Intended Use	For Over-The-Counter Use	Same
General Device Characteristic Differences		
Configurations	Strip	Cassette
Storage	15-30℃	4-30℃

VI Standards/Guidance Documents Referenced:

None referenced.

VII Performance Characteristics (if/when applicable):

A Analytical Performance:

1. Precision/Reproducibility:

Precision studies for InstaStrip Fentanyl Rapid Test (Urine) and InstaStrip Fentanyl Dipstick Test (Urine) were carried out at one site. The randomized and blinded study was performed 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 where the fentanyl cut-off concentration was 1 ng/mL. Samples with concentration of -100% cut-off were drug-free urine samples. Other samples were prepared by spiking target drug fentanyl in drug-free urine samples. Each drug concentration was confirmed by LC/MS. The samples were tested by three operators using three different device lots over a 10-day period, each operator tested a single lot. Six tests per day per concentration per lot were tested for a total 54 tests per day per lot.

Lot Number	-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 1	60-/0+	60-/0+	60-/0+	54-/6+	32+/28-	60+/0-	60+/0-	60+/0-	60+/0-
Lot 2	60-/0+	60-/0+	60-/0+	55-/5+	30+/30-	60+/0-	60+/0-	60+/0-	60+/0-
Lot 3	60-/0+	60-/0+	60-/0+	55-/5+	34+/26-	60+/0-	60+/0-	60+/0-	60+/0-

2. Linearity:

Not applicable, this device is intended for qualitative use only.

3. Analytical Specificity/Interference:

Cross- Reactivity:
To test specificity, similarly structured drug metabolites and other components that are likely to interfere in urine samples were tested using three lots of device by three different operators. Results are expressed as a minimum concentration of metabolite or compound required to produce a response approximately equivalent to the cutoff concentration of the assay. The percent cross reactivity of those compounds is listed below (if no cross reactivity was observed, the highest concentration tested is shown as <0.01%):

Compounds for cross reactivity	Concentration Approximately Equivalent to the Cut-off (ng/mL)	Percent (%) cross reactivity
Acetyl fentanyl	1	100
Acetyl norfentanyl	>10,000	<0.01
Acrylfentanyl	1.8	56
Alfentanil	>10,000	<0.01
Benzodioxole fentanyl	4.8	21
Butyryl fentanyl	1	100
Carfentanil	>10,000	<0.01
Crotonyl fentanyl	1	100

Despopionyl 2' fluoro-ortho-fluorofentanyl	>10,000	<0.01
Despropionyl fentanyl (4-ANPP)	10,000	0.01
Furanyl fentanyl	1.9	53
(±) β-hydroxythiofentanyl	7.5	13
Isobutyryl fentanyl	1.7	59
N-benzyl furanyl norfentanyl	>10,000	<0.01
N-benzyl parafluoro cyclopropyl norfentanyl	>10,000	<0.01
(±)-3-cis-methyl fentanyl	9.2	11
Norcarfentanil	>10,000	<0.01
Norfentanyl	>10,000	<0.01
o-Fluorofentanyl	1	100
4-Fluoro-isobutyryl fentanyl	1	100
Ocfentanil	2.2	45
Para-chloroisobutyrul fentanyl	1.8	56
Para-fluoro fentanyl	2.8	36
Para-fluorobutyryl fentanyl (p-FBF)	2.5	40
Remifentanil	>10,000	<0.01
Sufentanil	>10,000	<0.01
Tetrahydrofyranyl fentanyl	2.3	43
Valeryl fentanyl	2.9	34
β-hydroxyfentanyl	7.5	13
ω-1-Hydroxyfentanyl	7.5	13

The following structurally unrelated opioid compounds were tested at a concentration of 100 µg/mL. Negative results were obtained for all these compounds.

6-Acetyl morphine	Morphine
Amphetamine	Morphine-3-glucuronide
Buprenorphine	Naloxone
Buprenorphine glucuronide	Naltrexone
Ceftriaxone	Norbuprenorphine
M-Chlorophenylpiperazine	Norcodeine
Ciprofloxacin	Norketamine
Cocaine	Normeperidine
Codeine	Normorphine
Dextromethorphan	Noroxycodone
Dihydrocodeine	Ofloxacin
Diphehydramine	Oxycodone

Duloxetine	Oxymorphone
EDDP	Pentazocine (Talwin)
EMDP	Pipamperone
Fluoxetine	1-(3-chlorophenyl) Piperazine (hydrochloride)
Haloperidol	Quinidine
Heroin	Risperidone
Hydrocodone	Tapentadol
Hydromorphone	Thioridazine
Ketamine	Tilidine
Levorphanol	Tramadol
MDMA	Tramadol-O- Desmethyl
Meperidine	Tramadol-N- Desmethyl
Methadone	Trazodone
Methamphetamine	

Interference:
Potential endogenous and exogenous interfering substances commonly found in human urine, were added to drug-free urine and target drug fentanyl urines with concentrations at 50% below and 50% above cut-off levels. Tests were performed for compounds at a concentration of 100 µg/mL or specified concentrations using three lots of the device. No compounds showed any interference. Refer to the tables below for the compounds and levels tested.

Compounds tested at a concentration of 100 µg/mL are shown below.

Acetophenetidin	DL-Tyrosine	Octopamine
Acetylsalicylic acid	Doxepin	O-Hydroxyhippuric acid
Albuterol	Ecgonine methyl ester	Oxazepam
Aminopyrine	Ephedrine	Oxolinic acid
Amitriptyline	Erythromycin	Oxymetazoline
Amobarbital	Fenoprofen	Papaverine
Amoxicillin	Fluphenazine	Penicillin G
Ampicillin	Furosemide	Perphenazine
Apomorphine	Gentisic acid	Phencyclidine
Aspartame	Hydralazine	Phenelzine
Atropine	Hydrochlorothiazide	Phenobarbital
Benzilic acid	Hydrocortisone	Prednisone
Benzoic acid	Hydroxytyramine	Propoxyphene
Benzoylecgonine	Imipramine	Propranolol
Bilirubin	Isoproterenol	Pseudoephedrine
Bupropion	Ketamine	Ranitidine
Caffeine	Ketoprofen	Salicylic acid
Carbamazepine	Lidocaine	Secobarbital

Chloral hydrate	Loperamide	Serotonin (5-hydroxytyramine)
Chloramphenicol	Maprotiline	Sulfamethazine
Chlorothiazide	Meperidine	Sulindac
Chlorpromazine	Meprobamate	Tetrahydrocortisone 3-(β-Dglucuronide)
Cholesterol	Methapyrilene	Tetrahydrocortisone 3-acetate
Clomipramine	Methaqualone	Tetrahydrozoline
Clonidine	Methoxyphenamine	Thiamine
Cortisone	N-Acetylprocainamide	Thioridazine
Cotinine	Nalidixic acid	Triamterene
Cyclobenzaprine	Naloxone	Trifluoperazine
Deoxycorticosterone	Naltrexone	Trimethoprim
Desipramine	Naproxen	Tyramine
Dextromethorphan	Niacinamide	Uric acid
Diclofenac	Nicotine	Venlafaxine
Diflunisal	Nifedipine	Zomepirac
Digoxin	Norethindrone	β-Estradiol
Diphenhydramine	Nortriptyline	
DL-Tryptophan	Noscapine	

Compounds tested at specified concentrations are shown below.

Acetaminophen (500 µg/mL)
Acetone (1000 mg/dL)
Albumin (500 mg/dL)
Ascorbic Acid (560 mg/dL)
Boric acid (1% w/v)
Creatinine (500 mg/dL)
Ethanol (1%)
Galactose (10 mg/dL)
Gamma globulin (500 mg/dL)
Glucose (3000 mg/dL)
Hemoglobin (500 mg/dL)
Ibuprofen (500 µg/mL)
Isoxsuprine (20 µg/mL)
Labetalol (15 µg/mL)
Metronidazole (300 µg/mL)
NaCl (4000 mg/dL)
Oxalic acid (100 mg/dL)

Quinine (15 µg/mL)
Riboflavin (10 mg/dL)
Urea (2000 mg/dL)
Valproic acid (250 µg/mL)
Verapamil (20 µg/mL)

Effect of Urinary Specific Gravity and pH:
To investigate the effect of urine specific gravity and urine pH, urine samples with 1.000, 1.002, 1.008, 1.014, 1.019, 1.022, 1.030, and 1.035 specific gravity and urine samples with pH of 4.0, 5.0, 6.0, 7.0, 8.0, and 9.0 were spiked with target fentanyl at 50% below and 50% above cut-off levels. These samples were tested using three lots of the device. Results were all positive for samples at and above +50% cut-off and all negative for samples at and below -50% cut-off.

4. Assay Reportable Range:

   Not applicable.

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

   The drug calibrator for this device is traceable to a commercially available standard.

6. Detection Limit:

   Characterization of how the device performs at low concentrations appears in the precision section, VII.A.1, above.

7. Assay Cut-Off:

   Characterization of how the device performs at low concentrations appears in the precision section, VII.A.1, above.

B Comparison Studies:

1. Method Comparison:

Method comparison studies were performed by three operators using three device lots. Unaltered clinical samples included a total of 85 urine samples (42 Negative and 43 positive).
The samples were blind labeled and compared to LC/MS results. The results are summarized in the tables below.

		Negative	**Low Negative by LC/MS (less than -50%)**	**Near Cut-off Negative by LC/MS (Between -50% and cut-off)**	**Near Cut-off Positive by LC/MS (Between the cut-off and +50%)**	**High Positive by LC/MS (greater than +50%)**
	Positive	0	0	1	7	36

Operator 1	Negative	11	21	9	0	0
Operator 2	Positive	0	0	0	7	36
	Negative	11	21	10	0	0
Operator 3	Positive	0	0	0	6	36
	Negative	11	21	10	1	0

Discordant Results

Operator	Sample Number	LC-MS/MS Result	InstaStrip Result
Operator 1	310-13724	0.9	Positive
Operator 3	280-06705	1	Negative

2. Matrix Comparison:

Not applicable. These devices are for use with urine samples only.

C Clinical Studies:

1. Clinical Sensitivity:

Not applicable.

2. Clinical Specificity:

Not applicable.

3. Other Clinical Supportive Data (When 1. and 2. Are Not Applicable):

Lay User Study:
A lay user was performed at three intended user sites with 140 lay persons. 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: -100%, +/-75%, +/-50%, +/-25% of the cut-off by spiking fentanyl into drug free-pooled urine specimens. The concentrations of the samples were confirmed by LC/MS. Each sample was aliquoted into individual containers, blind-labeled and randomized. Each participant was provided with the package insert, 1 blind labeled sample and a device. A summary of the results is shown in the table below.

% of Cut-off by LC/MS	Number of samples	No. of Positive	No. of Negative	The percentage of correct results (%)
-100% Cut-off	20	0	20	100%
-75% Cut-off	20	0	20	100%
-50% Cut-off	20	0	20	100%
-25% Cut-off	20	1	19	95%
+25% Cut-off	20	20	0	100%

+50% Cut-off	20	20	0	100%
+75% Cut-off	20	20	0	100%

Lay-users were also given surveys on the ease of understanding the package insert instructions and device use, and the results were found to be acceptable. A Flesch-Kincaid reading analysis was performed on each package insert and the scores revealed a reading Grade Level of 7.

Read Time Flex Study:
The sponsor provided data to support the recommendation for read time. The sponsor recommends that the results should be read at 5 minutes and not after 20 minutes.

D Clinical Cut-Off:

Not applicable.

E Expected Values/Reference Range:

Not applicable.

VIII Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

IX Conclusion:

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