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

A. 510(k) Number:

k062575

B. Purpose for Submission:

New device

C. Measurand:

Amphetamine, Barbiturates, Benzodiazepines, Cocaine, Methamphetamine, Phencyclidine, Methadone, Opiates, THC, and Tricyclic Antidepressants.

D. Type of Test:

Qualitative immunoassay

E. Applicant:

Princeton BioMeditech Corporation

F. Proprietary and Established Names:

AccuSign RC DOA10 (MET/OPI/COC/THC/PCP/BZO/BAR/MTD/TCA/AMP)

StatusFirst DOA10 (MET/OPI/COC/THC/PCP/BZO/BAR/MTD/TCA/AMP)

G. Regulatory Information:

Product Code	Classification	Regulation Section	Panel
LAG	II	862.3610 Methamphetamine test system	91 (Tox)
DJG	II	862.3650, Enzyme Immunoassay, Opiates	91 (Tox)
DIO	II	862.3250, Enzyme Immunoassay, Cocaine and Cocaine Metabolites	91 (Tox)

Product Code	Classification	Regulation Section	Panel
DKE	II	862.3870 Cannabinoid test system	91 (Tox)
LCM	Unclassified (510k required)	862.3100 Enzyme immunoassay, Phencyclidine	91 (Tox)
DKZ	II	862.3100 Amphetamine test system	91 (Tox)
JXM	II	862.3170 Enzyme immunoassay, Barbiturate	91 (Tox)
DIS	II	862.3150 Barbiturate test system	91 (Tox)
DJR	II	862.3620 Methadone test system	91 (Tox)
LFI	II	862.3910 Tricyclic antidepressant drugs test system	91 (Tox)

H. Intended Use:

1. Intended use(s):
   See indications for use below.

2. Indication(s) for use:
   Immunoassay for the qualitative detection of methamphetamine, opiates, cocaine metabolite, THC metabolite, phencyclidine, benzodiazepines, barbiturates, tricyclic antidepressants, methadone, and amphetamine in human urine to assist in screening of drug of abuse samples. The detecting cut-off concentrations are as follows:

MET	D-Methamphetamine	1000 ng/mL
OPI	Morphine	300 ng/mL
COC	Benzoylecgonine	300 ng/mL
THC	11-nor-Δ^9-9-carboxylic acid	50 ng/mL
PCP	Phencyclidine	25 ng/mL
Benzodiazepine	Oxazepam	300 ng/mL
Barbiturate	Secobarbital	300 ng/mL
Methadone	Methadone	300 ng/mL
TCA	Nortriptyline	1000 ng/mL
AMP	D-Amphetamine	1000 ng/mL

This assay provides only a preliminary analytical test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS)/ High performance liquid chromatography (HPLC, for TCA) are the preferred confirmatory methods. Clinical consideration and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are obtained.

3. Special conditions for use statement(s):
   For prescription use only.

   Certain foods or medications containing opiates or opiate derivatives, amphetamines, methamphetamine, barbiturate, benzodiazepines, or tricyclics may produce a positive result in any chemical or immunological assay. Poppy seeds can contain opiates or ingestion of products containing poppy seeds can cause a positive result.

4. Special instrument requirements:
   For use with the DXpress Reader or as a visually read test.

I. Device Description:

The AccuSign RC DOA 10 and the Status First DOA 10 are one-step immunoassays that are sold in two packaging: 10 tests or 35 test kits. Each individual test contains the test device, disposable sample dispenser and instructions for use booklet.

J. Substantial Equivalence Information:

1. Predicate device name(s):

   AccuSign DOA 10, hCG Pregnancy Test and NT proBNP Test

2. Predicate K number(s):

   k983501, k050955 and k051596

3. Comparison with predicate:

   The following chart compares the device with the AccuSign DOA 10 (k983501)

Similarities		
Item	Device	Predicate
Intended use	For the qualitative detection of 10 drugs of abuse in human urine	Same
Assay principle	Lateral flow immunochromatographic	Same

Similarities		
Item	Device	Predicate
	assay	
Test Procedure	Add 3 drops of urine into the sample well	Same
Result reading time	5 min	Same
Matrix	Human urine	Same
Volume	3 drops	Same
Detection Cutoff	MET 1000 ng/mL OPI 300 ng/mL COC 300 ng/mL THC 50 ng/mL PCP 25 ng/mL Benzod. 300 ng/mL Barbiturate 300 ng/mL Methadone 300 ng/mL TCA 1000 ng/mL AMP 1000 ng/mL	Same
Differences		
Reading Method	DXpress Reader or visual	Visual only

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

None referenced.

L. Test Principle:

The AccuSign RC•DOA10 test uses solid-phase chromatographic membrane immunoassay technology for the qualitative, simultaneous detection of methamphetamine, opiates, cocaine, THC, phencyclidine, benzodiazepines, barbiturates, methadone, tricyclic antidepressants, and amphetamine in human urine. The test relies on competitive binding of the antibodies between drug conjugate and drug which may be present in the urine sample. A sample of urine is placed in the sample well of the device and is allowed to migrate upward. If the drug is present in the urine sample, it competes with the drug conjugate, which is bound to the dye, for the limited antibodies immobilized on the membrane. If the drug or drug metabolite levels are above the cutoff level, the drug will saturate the antibodies, thus inhibiting the binding of the dye coated with drug conjugates to the antibodies on the membrane. This prevents the formation of a line on the membrane. Therefore, a preliminary drug-positive urine sample will not generate a line in the test window, indicating a positive result from positive drug competition, while a negative urine sample will generate a line in the test window, indicating a negative result from an absence of competition with free drugs.

In addition to the Test line that may appear in the Test window (T), a Control line is present in the Control window (C) which should always appear if sufficient sample volume is used applied and the sample migrates correctly up the test strip membrane.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

The sponsor conducted precision studies for each drug on the DOA 10 panel. Spiked urine controls with concentrations of 0, 50% below cutoff, 25% below cutoff, cutoff, +25% above cutoff, 50% above cutoff and 100% above cutoff levels were tested. Ten devices at each concentration were tested on three readers for two days with two lots of test devices by three operators (total 40 tests per level, per operator). The samples were aliquoted and randomly given to operators for a blind study. The test result was visually read at 5 minutes after adding urine sample and then immediately read with the DXpress reader. There were no significant differences between readers, operators, between days or between lots for the ten tests on the panel.

Drug name cutoff (ng/mL)	Conc. (ng/ml)	Total (Reader) pos./ neg.	Total (Reader) % agree-ment	Total (Visual) pos./ neg.	Total (Visual) % agree-ment
	0	0/120	100	0/120	100
	500	0/120	100	0/120	100
MET	750	22/98	82	17/103	86
	1000	73/47	N/A	64/56	N/A
1000	1250	113/7	94	113/7	94
	1500	119/1	99	120/0	100
	2000	120/0	100	120/0	100
	0	0/120	100	0/120	100
	150	0/120	100	0/120	100
OPI	225	1/119	99	3/117	98
	300	58/62	N/A	60/60	N/A
300	375	99/21	83	101/19	84
	450	117/3	98	117/3	98
	600	120/0	100	120/0	100
	0	0/120	100	0/120	100
	150	1/119	99	1/119	99
COC	225	30/90	75	28/92	77
	300	83/37	N/A	74/46	N/A
300	375	111/9	93	109/11	91
	450	120/0	100	120/0	100
	600	120/0	100	120/0	100
	0	0/120	100	0/120	100
	25	0/120	100	0/120	100
THC	37.5	9/111	93	9/111	93
	50	72/48	N/A	59/61	N/A

Drug name cutoff (ng/mL)	Conc. (ng/ml)	Total (Reader)		Total (Visual)	
		pos./ neg.	% agree-ment	pos./ neg.	% agree-ment
50	62.5	109/11	91	107/13	89
	75	117/3	98	118/2	98
	100	120/0	100	120/0	100
	0	0/120	100	0/120	100
	12.5	0/120	100	0/120	100
PCP	18.75	6/114	95	4/116	97
	25	68/52	N/A	70/50	N/A
25	31.25	117/3	98	115/5	96
	37.5	119/1	99	119/1	99
	50	120/0	100	120/0	100
	0	0/120	100	0/120	100
	150	0/120	100	0/120	100
BZO	225	24/96	80	23/97	81
	300	77/43	N/A	71/49	N/A
300	375	110/10	92	109/11	92
	450	120/0	100	118/2	98
	600	120/0	100	120/0	100
	0	0/120	100	0/120	100
	150	3/117	98	0/120	100
BAR	225	27/93	78	27/93	78
	300	81/39	N/A	69/51	N/A
300	375	110/10	92	110/10	92
	450	120/0	100	120/0	100
	600	120/0	100	120/0	100
	0	0/120	100	0/120	100
	150	2/118	98	2/118	98
MTD	225	32/88	73	36/84	70
	300	90/30	N/A	78/42	N/A
300	375	112/8	93	109/11	91
	450	119/1	99	119/1	99
	600	120/0	100	120/0	100
	0	0/120	100	0/120	100
	500	0/120	100	0/120	100
TCA	750	5/115	96	8/112	93
	1000	63/57	N/A	69/51	N/A
1000	1250	101/19	84	99/21	83
	1500	119/1	99	120/0	100
	2000	120/0	100	120/0	100
	0	0/120	100	0/120	100
	500	1/119	99	1/119	99
AMP	750	27/93	78	32/88	73
	1000	92/28	N/A	80/40	N/A

Drug name cutoff (ng/mL)	Conc. (ng/ml)	Total (Reader)		Total (Visual)	
		pos./ neg.	% agree-ment	pos./ neg.	% agree-ment
1000	1250	116/4	97	115/5	96
	1500	118/2	98	118/2	98
	2000	120/0	100	120/0	100

b. *Linearity/assay reportable range:*
Not applicable for a qualitative assay.

c. *Traceability, Stability, Expected values (controls, calibrators, or methods):*
This device has internal process controls. A colored line appearing in the control region confirms that sufficient sample volume was added and that the sample migrated correctly up the test strip membrane.. Users are informed not to interpret the test if a colored line failed to appear in the control region. External controls are not supplied with this device. The sponsor recommends the use of commercially available controls to be used with the DXpress Reader. The DXpress reader will report "Control:Valid" and test result only if the internal process controls are satisfied.

Stability testing of the test strips was previously reviewed under k983501. To validate this claim using both the reader and strips visually read, the sponsor performed additional stability studies. The results from these studies showed expected results for all concentrations and support the sponsor real time 15 month stability claim.

d. *Detection limit:*
A cutoff value validation study (see precision section above for a summary of the data) was conducted at seven different drug concentrations to include 0, +/- 50% of the cutoff, +/- 75% of the cutoff, the cutoff and +100% of the cutoff. The samples used were GC/MS or HPLC confirmed. Three operators were used to analyze two assay lots. The results demonstrate performance at the sponsor's chosen cutoffs of methamphetamine as 1000 ng/mL, opiates as 300 ng/mL, cocaine as 300 ng/mL, THC as 50 ng/mL, PCP as 25 ng/mL, benzodiazepine as 300 ng/mL, barbiturate as 300 ng/mL, methadone as 300 ng/mL, TCA as 1000 ng/mL, amphetamine as 1000 ng/mL.

e. *Analytical specificity:*

e.1. Cross reactivity
The following table lists compounds that are detected by the AccuSign® RC•DOA10 (MET/OPI/ COC/THC/PCP//BAR/BEZ/MTD/TCA/AMP) test. The specificity of the AccuSign® RC•DOA 10 test was determined by adding

various drugs and drug metabolites to the pooled drug-negative urine specimens and testing with the AccuSign® RC·DOA10 test. The cross reactivity in the following tables were tested with both the reader and the visual tests. The results are expressed in terms of the minimum concentration required to produce a positive result.

	Cross Reacting	**Concentration (ng/mL)**
MET		
	D-Amphetamine	>100,000
	D,L-Amphetamine	>100,000
	(–)Ephedrine	>100,000
	(+)Ephedrine	>100,000
	Isometheptene	12,500
	D-Methamphetamine	1,000
	p-OH-Methamphetamine	3,000
	Methylenedioxyamphetamine	>100,000
	Methylenedioxymethamphetamine	1,000
	Methylenedioxyethylamphetamine(MDEA)	>100,000
OPI		
	Codeine	300
	Hydrocodone	500
	Hydromorphone	500
	Lavofloxacin	100,000
	Levophanol	5000
	Meperidine	>100,000
	Morphine	300
	Morphine-3-ß-D-glucuronide	300
	Nalorphine	15,000
	Naloxone	>100,000
	Norcodeine	>100,000
	Oxycodone	5,000
	Oxymorphone	20,000
	Thebaine	10,000
	Tramadol	>100,000
COC		
	Benzoylecgonine	300
	Cocaine HCl	>100,000
	Ecgonine HCl	>100,000
THC		
	Cannabinol	10,000
	11-nor-Δ^8-THC-9-COOH	100
	11-nor-Δ^9-THC-9-COOH	50
	Δ^8-THC	10,000

	Δ^9-THC	5,000
	11-hydroxy-Δ^9-THC	4,000
PCP		
	Phencyclidine	25
	Thienylcyclohexyl-piperidine	450
BZO		
	Alprazolam	100,000
	Bromazepam	1,250
	Chlordiazepoxide	500
	Clobazam	>100,000
	Clonazepam	30,000
	Clorazepate dipotassium	2000
	Delorazepam	1,500
	N-Desalkylflurazepam	2,500
	Diazepam	10,000
	Estazolam	>100,000
	Flunitrazepam	>100,000
	7-amino flunitrazepam	1,500
	a-Hydroxyalprazolam	100,000
	a-Hydroxytriazolam	10,000
	Lorazepam	2,500
	Lormetazepam	25,000
	Medazepam	10,000
	Midazolam	25,000
	Nitrazepam	100,000
	Nordiazepam(N-Desmethyldiazepam)	7,500
	Oxazepam	300
	Prazepam	>100,000
	Temazepam	6,000
	Triazolam	>100,000
BAR		
	Allobarbital	400
	Alphenal	250
	Amobarbital	5,000
	Aprobarbital	400
	Barbital	1,500
	Butalbital	800
	Cyclopentobarbital	400
	Pentobarbital	2,000
	Phenobarbital	5,000
	Penytoin	4,000

	Secobarbital	300
	Thiopental	>100,000
MTD		
	Diphenhydramine	>100,000
	Doxylamine	>100,000
	EDDP	>100,000
	EMDP	>100,000
	Imipramine	>100,000
	LAAM	900
	Methadone	300
	Meperidine	>100,000
	Nor-LAAM	3,000
TCA		
	Amitryptiline	800
	Chlorpromazine	100,000
	Clomipramine	5,000
	Cyclobenzaprine	2,500
	Desipramine	1,500
	Diphenhydramine	>100,000
	Dothiepin	2,000
	Doxepin	1,500
	Imipramine	1,000
	Norclomipramine	850
	Nordoxepin	5,000
	Nortriptyline	1,000
	Perphenazine	41,000
	Promazine	5,000
	Protryptiline	2,000
	Trimipramine	3,000
AMP		
	D-Amphetamine	1,000
	D,L-Amphetamine	1,800
	L-Amphetamine	37,500
	Benzphetamine	>100,000
	d-Methamphetamine	>100,000
	p-OH-Methamphetamine	>100,000
	Methylenedioxyamphetamine	2,000
	Methlyenedioxymethamphetamine	>100,000
	ß-Phenylethylamine	40,000
	l-Phenylpropanolamine	>100,000

Phentermine	>100,000
Tryptamine	50,000
Tyramine	70,000
3-OH-Tyramine	50,000

e.2. Interference

Each compound was added with the concentration given below to urine samples which had 50% or 150 % cutoff concentration of each drug. Each spiked urine sample was tested in triplicate. The result was interpreted as no interference if 50 % cutoff level urine sample with spiked compound showed negative result and 150% cutoff level urine sample with spiked compound showed positive result. No interference was observed at the concentration below.

Compounds	Test Concentration (mg/dL)
Protein	2000
Hemoglobin	25
Bilirubin	2
Glucose	1500
Creatinine	20
Sodium Nitrite	100
Sodium Chloride	1500

Additionally, the sponsor tested many common substances and biological materials (104) for cross-reactivity with the drug of abuse tests at a concentration of 100 μg/mL in drug-free and drug positive urines. The sponsor states that they was no cross-reactivity detected with the visual tests. The compounds are listed in the package insert.

e.3 Urinary pH

The effect of urine sample pH on the assay result was examined. The pH 4.5 to pH 8.5 urine samples were tested with concentrations of 50% cutoff level and 150% cutoff level for each drug. At each pH and each concentration the test was repeated 10 times. There was no discrepancy from expected in the results with different pHs and showed that there was no interference from urine pH ranging from 3 to 9.

e.4. Specific gravity

The effect of specific gravity of urine samples on the test result was examined. The urine samples with specific gravity 1.002 and 1.04 were tested at 50% cutoff level and 150% cutoff levels for each drug. At each specific gravity and each concentration the test was repeated ten times. There was no discrepancy from expected in the results with different

specific gravity and showed that there was no interference from specific gravity.

f. Assay cut-off:

Characterization of how the device performs analytically around the claimed cutoff concentration appears in the precision above.

2. Comparison studies:

a. Method comparison with predicate device:
The performance of AccuSign® RC·DOA10 was evaluated in comparison to the result of GC/MS (HPLC for TCA). Over 40 clinical samples which contain drugs were tested and the results were compared to the GC/MS or HPLC values. Additionally, the sponsor tested 100 drug negative samples were collected from people who apparently were not taking the drug. All test results were read visually and with the DXpress reader. There was no significant difference between the reader and the visual test results. The table below lists the compounds analyzed by GC/MS or HPLC and the results of the method comparison study.

Compounds that were found in the clinical samples tested

Drug	**Compounds analyzed for each drug**
THC	11-nor-Δ-9-carboxy-THC
OPI	Morphine, Codeine, Oxycodone, Oxymorphone, 6-Acetylmorphine
COC	Benzoylecgonine
MET	Methamphetamine, Amphetamine
AMP	Amphetamine, Methamphetamine
PCP	Phencyclidine
BZO	Oxazepam, Nordiazepam, Temazepam, 7-aminoclonazepam, Lorazepam, Alprazolam, a-Hydroxyalprazolam
BAR	Secobarbital, Butalbital, Phenobarbital, Amobarbital
MTD	Methadone, EDDP
TCA	Nortriptyline, Amitriptyline, Imipramine, Despramine, Doxepine, Nordoxepine, Cyclobenzaprine, Norcyclobenzaprine, Clomipramine, Norclomipramine

Drug Name		Negative*		Negative (< 50% cutoff)		Negative (50%cutoff to cutoff)		Positive (cutoff to 150% cutoff)		Positive (> 150% cutoff)		% Agreement with GC/MS	
		R	**V**	**R**	**V**	**R**	**V**	**R**	**V**	**R**	**V**	**R**	**V**
THC	**Pos.**	0	0	0	0	0	0	11	10	40	40	98 (51/52)**	96 (50/52)
	Neg.	100	100	7	7	10	10	0	1	1	1	100 (117/117)	100 (117/117)
OPI	**Pos.**	0	0	1	1	4	4	8	8	49	49	100 (57/57)	100 (57/57)
	Neg.	100	100	15	15	8	8	0	0	0	0	96 (123/128)	96 (123/128)
COC	**Pos.**	0	0	0	0	2	2	5	5	47	47	98 (52/53)	98 (52/53)
	Neg.	100	100	13	13	11	11	1	1	0	0	98 (124/126)	98 (124/126)
MET	**Pos.**	0	0	0	0	6	6	6	6	42	42	98 (48/49)	98 (48/49)
	Neg.	100	100	14	14	5	5	1	1	0	0	95 (119/125)	95 (119/125)
PCP	**Pos.**	0	0	0	0	0	0	14	13	49	49	95 (63/66)	94 (62/66)
	Neg.	100	100	6	6	9	9	1	2	2	2	100 (115/115)	100 (115/115)
BZO	**Pos.**	0	0	0	0	3	3	6	6	53	53	100 (59/59)	100 (59/59)
	Neg.	100	100	7	7	7	7	0	0	0	0	97 (114/117)	97 (114/117)
BAR	**Pos.**	0	0	0	0	0	0	4	4	42	42	98 (46/47)	98 (46/47)
	Neg.	100	100	10	10	8	8	1	1	0	0	100 (118/118)	100 (118/118)
MTD	**Pos.**	0	0	0	0	1	1	6	6	71	72	99 (77/78)	100 (78/78)
	Neg.	100	100	10	10	8	8	0	0	1	0	99 (118/119)	99 (118/119)
TCA **	**Pos.**	0	0	0	0	0	0	5	5	36	36	100 (41/41)	100 (41/41)
	Neg.	100	100	11	11	9	9	0	0	0	0	100 (120/120)	100 (120/120)
AMP	**Pos.**	0	0	0	0	1	1	8	8	39	39	96 (47/49)	96 (47/49)
	Neg.	100	100	16	16	13	13	2	2	0	0	99 (129/130)	99 (129/130)

*Negative urine samples were collected from people who apparently were not taking the drug.
**The numbers in parentheses are Correct results / Total numbers tested.
R=Reader
V=Visual

The concentration for the false positive opiate (morphine) result was 124 ng/mL. The concentrations for the false negative PCP results were 46 and 52 ng/mL. The concentration for the false negative methadone result was 822 ng/mL.

b. Matrix comparison:

Not applicable. This is a urine only assay

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):

Not applicable.

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.