RANDOX

DRUGS OF ABUSE ARRAY URINE

—evidence—
MULTISTAT

INTENDED USE

The Evidence MultiSTAT DOA Urine Assays are tests for the qualitative determination of the parent molecule and metabolites of drugs in human urine. They are competitive enzyme immunoassays run on the automated biochip array analyser, Evidence MultiSTAT.

FOR FORENSIC USE ONLY. Not for use in diagnostic procedures

The Evidence MultiSTAT DOA Urine Assays provide 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[1]. Other chemical confirmation methods are available. Clinical consideration and professional judgement should be applied to any drug of abuse test result, particularly when preliminary positive results are used.

Cat. No. EV4193

Containing the following components:

1.	Urine Test Cartridge	12 x 1 Cartridge
2.	Urine Cut Off	6 x 1 ml
3.	Urine Positive Control	4 x 1 ml
4.	Reconstitution Buffer	2 x 10 ml
5.	Sample Droppers	24 x Dropper

Cat. No. EV4116

Containing the following components:

1.	MultiSTAT Tip Cartridge	12 x 1 Tip Cartridge

CLINICAL SIGNIFICANCE

Drug abuse in any form gives rise to serious negative consequences not only for the abuser by devastating their mental and physical health, but also to the whole of society. It is an indirect and direct cause of many crimes and also in the spread of diseases. It is very costly, with costs related to crimes, medical care, treatment and welfare programs for addicted individuals and wasted working hours [1]. Urine drug testing can provide a tool for detecting users and for monitoring the compliance of subjects in recovery programs [2],

PRINCIPLE

The Evidence MultiSTAT analyser is a fully automated Biochip Array System. It performs simultaneous detection of multiple analytes from a single sample. The core technology is the Randox Biochip, a solid-state device containing an array of discrete test regions containing immobilized antibodies specific to different DOA compound classes. A competitive chemiluminescent immunoassay is employed for the DOA assays with the drug in the specimen and drug labelled with horseradish peroxidase (HRP) being in direct competition for the antibody binding sites. Increased levels of drug in a specimen will lead to reduced binding of drug labelled with HRP and thus a reduction in chemiluminescence being emitted.

The light signal generated from each of the test regions on the biochip is detected using digital imaging technology and compared to that from the cut off material. The classification of test analyte present in the sample is determined from the cut off material.

LIMITATIONS

Note: Please store MultiSTAT cartridges with label facing upwards.

- If this is not adhered to the integrity of the cartridge may be compromised and could impact on test results.
- Visually check the cartridge foil for evidence of moisture or damage to the foil seal.
- If there is any concern that the integrity of the cartridge has been compromised, do not use and contact Randox Toxicology Support.

- The Evidence MultiSTAT DOA Urine Array is designed for use only with human urine samples.
- There is a possibility that other substances and/or factors may interfere with the assays and cause erroneous results (e.g. technical or procedural errors).
- These assays have been designed to reduce HAMA and other heterophilic antibodies interference. However, HAMA and other heterophilic antibodies can react with the immunoglobulins included in the assay components. Clinical consideration and professional judgement should be applied to any drugs of abuse qualitative test result.

SPECIMEN COLLECTION AND PREPARATION

- The Evidence MultiSTAT DOA Urine Array is designed for use with human urine samples. Randox has not tested all possible applications of this assay.
- Collection devices should be durable, leak-proof and constructed of non-absorbing plastics. The specimen should be free of faecal contamination and should not contain foreign materials – centrifuge if turbid.
- Samples should be at a room temperature of +15 to +25°C (+59 to +77°F) for testing.
- Fresh urine samples do not require any pre-treatment. Use of chemical preservatives is not recommended for urinalysis

SAMPLE STORAGE AND STABILITY

- Generally, it is accepted that the chemical composition of urine changes, and formed elements begin to deteriorate after it has been left standing 2 hours at room temperature.
- If the urine sample is not being analysed immediately it is recommended that it be stored at +2 to +8°C for up to 72 hours.
- There is no agreed length of time for refrigeration, however most drugs degrade in a urine specimen over time. This process is much slower in a refrigerated specimen and slower yet in a frozen specimen and thus, for prolonged storage, freezing of samples is recommended.
  The specimen should be at room temperature before proceeding with the analysis

SAFETY PRECAUTIONS AND WARNINGS

For *in vitro* human forensic use only. Do not pipette by mouth. Exercise the normal precautions required for handling laboratory reagents.

Wash buffer and Reconstitution buffer contain preservative. Avoid ingestion or contact with skin or mucous membranes.

Human samples should be handled and treated as if they are potentially infectious.

Please dispose of all biological and chemical materials according to local guidelines.

Health and Safety data sheets are available on request.

On opening the cartridge foil bag, visually check the cartridge for evidence of moisture and the cartridge foil for signs of tearing. If there is any concern that the integrity of the cartridge has been affected, do not use and contact Randox Toxicology Support.

REAGENT COMPOSITION

Contents

1. **MULTISTAT DOA URINE ASSAY DILUENT**
   20 mM phosphate buffer, pH 7.2 containing protein, detergents and preservatives. This is contained within the cartridge.

2. **MULTISTAT DOA URINE CONJUGATE**
   20 mM Tris based buffer, pH 7.0 containing protein, preservatives and horseradish peroxidase - labelled drug derivatives. This is contained within the cartridge.

3. **MULTISTAT DOA URINE BIOCHIP**
   Solid substrate containing immobilized antibody discrete test regions. This is contained within the cartridge.

4. **MULTISTAT DOA URINE WASH BUFFER**
   20 mM Tris buffered saline, pH 7.4, containing surfactant and preservatives. This is contained within the cartridge.

5. **LUM-EV934/PX**
   Luminol-EV934 and Peroxide are contained within the cartridge and are mixed in a ratio of 1:1 by the analyser to give the working signal reagent

6. **MULTISTAT DOA URINE CUT OFF**
   Lyophilised, 20 mM phosphate buffer, pH 7.2 containing stabilizers, preservatives and drug concentrations as outlined below.

7. **MULTISTAT DOA URINE POSITIVE CONTROL**
   Lyophilised, 20 mM phosphate buffer, pH 7.2 containing stabilizers, preservatives and drug concentrations as outlined below.

8. **MULTISTAT RECONSTITUTION BUFFER**
   A solution at a neutral pH containing preservatives.

STABILITY AND PREPARATION OF REAGENTS

1. **MULTISTAT DOA URINE TEST CARTRIDGE**
   The test cartridge is ready for use and is stable up to the expiry date when stored at +2°C to +8°C, protected from light. Test cartridges must be brought to room temperature for at least 30 minutes before opening.
   Once an individual test cartridge is open and out of its foil bag, it should be used for testing immediately.

2. **MULTISTAT DOA URINE CUT OFF**
   Lyophilised cut offs are stable until the expiry date when stored unopened, at +2 to +8°C. Gently tap the vial on the bench to ensure all material is at the bottom of the vial. Open the vial by partially removing the rubber stopper, avoiding any loss of material. Reconstitute in 1ml of accurately measured reconstitution buffer. Replace the rubber stopper and close the vial. After 2 minutes, swirl the vial gently and complete 3 quick inversions to ensure that all the material is dissolved, then leave upright for 30 minutes out of bright light before use. Following reconstitution, ensure that the vial is stored upright and does not come in contact with the bung or plastics. Once reconstituted, the cut off material is stable for 14 days when stored at +2 to +8°C.

3. **MULTISTAT DOA URINE POSITIVE CONTROL**
   Lyophilised positive controls are stable until the expiry date when stored unopened, at +2 to +8°C. Gently tap the vial on the bench to ensure all material is at the bottom of the vial. Open the vial by partially removing the rubber stopper, avoiding any loss of material. Reconstitute in 1ml of accurately measured reconstitution buffer. Replace the rubber stopper and close the vial. After 2 minutes, swirl the vial gently and complete 3 quick inversions to ensure that all the material is dissolved, then leave upright for 30 minutes out of bright light before use. Following reconstitution, ensure that the vial is stored upright and does not come in contact with the bung or plastics. Once reconstituted the cut off material is stable for 14 days when stored and +2 to +8°C.

4. **MULTISTAT RECONSTITUTION BUFFER**
   Reconstitution Buffer is ready for use and is stable up to the expiry date when stored at +2 to +8°C protected from light.

PROCEDURE

BATCH UPDATE FROM USB

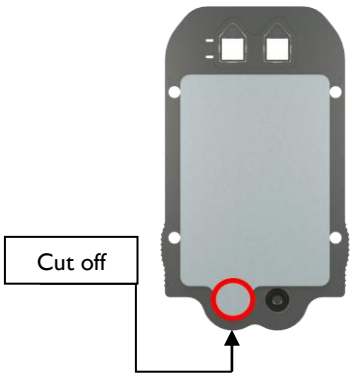
Upon receipt of a new batch of EV4193 a batch specific update will have to be completed from the USB provided:

- Scan the cartridge barcode – when scanned for the first time this will prompt the user to import the batch details from the provided USB.
- Insert the USB in to the USB port located on the bottom right hand side of the analyser below the power button.
- Once the USB has been connected select the import data button on screen.
- Select the batch update and select OK.
- A loading screen will appear briefly and the batch update will now be complete.
- For each batch, an initial 'Batch QC' must be run on the analyser, this will consist of running the provided Cut off and positive control material as indicated in the assay protocol section.

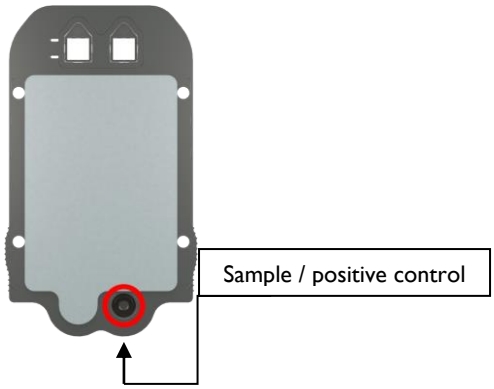
For further information please refer to the Evidence MultiSTAT Operators Manual.

ASSAY PROTOCOL

1. Pierce the foil and pipette a minimum of 200 µl of cut off into the left foil covered well as indicated below.



2. Pipette a minimum of 200 µl of sample / positive control into the open sample well on the right as indicated below.



3. The cartridge is now ready to be inserted carefully into the Evidence MultiSTAT analyser along with a new tip cartridge (Catalogue Number EV4116) ready for analysis.

CARTRIDGE ANALYSIS

Please refer to the Operators Manual for general operating procedure.

RESULTS PROCESSING

Results are processed automatically using the dedicated software.

MATERIALS PROVIDED

1.	Urine Test Cartridge	12 x 1 Cartridge
2.	Urine Cut Off	6 x 1 ml
3.	Urine Positive Control	4 x 1 ml
4.	Reconstitution Buffer	2 x 10 ml
5.	Sample Droppers	24 x Dropper

MATERIALS REQUIRED BUT NOT PROVIDED

1. Pipette

QUALITATIVE ANALYSIS

Each test sample is assayed against the provided cut off material of known concentration which is used to determine the classification of the samples. (Refer to Evidence MultiSTAT Operators Manual for additional information.)

QUALITY CONTROL

Evidence MultiSTAT® DOA Urine Positive Control Material is provided with the kit and is required to run the initial batch QC upon receipt of the kit. Following this the Batch QC should be repeated at 30-day intervals. The positive control material can be assayed more frequently at the discretion of the user. Control results should be acceptable, otherwise corrective action should be taken as established by laboratory guidelines.

INSTRUMENT SETTINGS

Instrument settings are included in the batch update.

REFERENCES

1. Vetulani J. (2001) Drug addiction. Part I. Psychoactive substances in the past and presence. *Pol. J. Pharmacol.* 53(3):201-214.
2. Glass L R, Ingalls S T, Schilling C L and Hoppel C L, Atypical Urinary Opiate Excretion Pattern, Journal of Analytical Toxicology, October 1997; 21:509-514.

CUT OFF MATERIAL

In order to provide a qualitative result, the sample must be assayed against a cut off of known concentration. Table 1 indicates the cut off concentrations for each of the assays on the Evidence MultiSTAT DOA Urine Array. If the concentration of drug in the sample is greater than the cut off the result will be reported as POSITIVE. If the concentration of drug in the sample is less than the cut off the result will be reported as NEGATIVE.

CREATININE reporting: A normal sample will contain a concentration greater than the cut off and will report NEGATIVE for adulteration. An adulterated sample will have a concentration less than the cut off and will report POSITIVE for adulteration.

Table 1. Cut Off Concentrations for the Evidence MultiSTAT DOA Urine Array.

Assay	Cut Off
Fentanyl	2 ng/ml
ETG	750 ng/ml
Methamphetamine	200 ng/ml
Barbiturates	200 ng/ml
Benzodiazepines I	150ng/ml
Benzodiazepines II	150ng/ml
Methadone	300 ng/ml
Opiate	200 ng/ml
BZG/Cocaine	150 ng/ml
Oxycodone	50 ng/ml
Tramadol	5 ng/ml
TCA	150ng/ml
Cannabinoids (THC)	20 ng/ml
Amphetamine	200 ng/ml
Buprenorphine	1 ng/ml
6-MAM	10 ng/ml
Synthetic Cannabinoids (JWH-018)	20 ng/ml
alpha-PVP	5 ng/ml
Synthetic Cannabinoids (UR-144)	10 ng/ml
AB PINACA	2.5ng/ml
Creatinine	20mg/dl

PERFORMANCE DATA

REPEATABILITY

The repeatability for all analytes on the Evidence MultiSTAT DOA Urine array was determined by assessing control material prepared at the cut off and at ±50% of the cut off. Each sample was assessed against the cut off material twice a day for 10 days, resulting in n=20 results for each sample. The % agreement is calculated for the number of samples that correctly reported negative and positive as shown in Table 2.

Table 2. Repeatability of Evidence MultiSTAT DOA Urine Array.

ASSAY		-50%	CUT OFF	+50%	% AGREE
FENT	+	0	13	20	100
	-	20	7	0	
ETG	+	0	8	19	97.5
	-	20	12	1	
MAMP	+	0	12	20	100
	-	20	8	0	
BARB	+	0	8	20	100
	-	20	12	0	
BENZ I	+	0	12	20	100
	-	20	8	0	
BENZ II	+	0	11	20	100
	-	20	9	0	
MDONE	+	0	12	20	100
	-	20	8	0	
OPIATE	+	0	12	20	100
	-	20	8	0	
BZG	+	0	12	20	100
	-	20	8	0	
OXYC	+	0	7	20	100
	-	20	13	0	
TRAM	+	0	12	20	100
	-	20	8	0	
TCA	+	0	11	20	100
	-	20	9	0	
THC	+	0	14	20	100
	-	20	6	0	
AMP	+	0	7	20	100
	-	20	13	0	
BUP	+	0	8	20	100
	-	20	12	0	
6-MAM	+	0	14	20	100
	-	20	6	0	
JWH-018	+	0	12	20	100
	-	20	8	0	
APVP	+	0	10	20	100
	-	20	10	0	
UR-144	+	0	9	20	100
	-	20	11	0	
AB-PIN	+	0	8	19	97.5
	-	20	12	1	
CREAT	+	20	10	0	100
	-	0	10	20	

Note: For the creatinine assay the -50% sample was spiked for 10mg/dL and reported POSITIVE for adulteration. The +50% sample was spiked for 30mg/dL and reported NEGATIVE for adulteration.

LIMIT OF DETECTION

The limit of detection for all analytes on the Evidence MultiSTAT DOA Urine Array was established by analysing 20 authentic negative, unadulterated urine samples. Each sample was assessed against the cut off material to determine a positive or negative result as shown in Table 3.

Table 3. Limit of Detection of the Evidence MultiSTAT DOA Urine Array.

ASSAY	REPORT POSITIVE	REPORT NEGATIVE
FENT	0	20
ETG	0	20
MAMP	0	20
BARB	0	20
BENZ I	0	20
BENZ II	0	20
MDONE	0	20
OPIATE	0	20
BZG	0	20
OXYC	0	20
TRAM	0	20
TCA	0	20
THC	0	20
AMP	0	20
BUP	0	20
6-MAM	0	20
JWH-018	0	20
APVP	0	20
UR-144	0	20
AB-PIN	0	20
CREAT	0	20

ACCURACY

The accuracy for all analytes on the Evidence MultiSTAT DOA Urine Array was determined by assessing spiked samples at varying concentrations (50 spiked positive samples prepared at concentrations greater than the cut off, 10 negative spiked samples prepared at concentrations lower than the cut off and 40 blank negative samples). Each sample was assessed against the cut off material to determine a positive or negative result. The % agreement was calculated as the % of correct reports out of the total number of samples (n=100) analysed, as shown in Table 4.

Table 4. Accuracy of the Evidence MultiSTAT DOA Urine Array.

ASSAY		SPIKE +	SPIKE -	% AGREE
FENT	+	50	0	100
	-	0	50	
ETG	+	50	0	100
	-	0	50	
MAMP	+	50	0	100
	-	0	50	
BARB	+	50	0	100
	-	0	50	
BENZ I	+	50	0	100
	-	0	50	
BENZ II	+	50	0	100
	-	0	50	
MDONE	+	50	0	100
	-	0	50	
OPIATE	+	50	0	100
	-	0	50	
BZG	+	50	0	100
	-	0	50	
OXYC	+	50	0	100
	-	0	50	
TRAM	+	50	0	100
	-	0	50	
TCA	+	50	0	100
	-	0	50	
THC	+	44	0	94
	-	6	50	
AMP	+	50	0	100
	-	0	50	
BUP	+	46	0	96
	-	4	50	
6-MAM	+	50	0	100
	-	0	50	
JWH-018	+	50	0	100
	-	0	50	
APVP	+	50	0	100
	-	0	50	
UR-144	+	50	0	100
	-	0	50	
AB-PIN	+	50	0	100
	-	0	50	
CREAT	+	50	0	100
	-	0	100	

Note: Spike + Samples for Creatinine are POSITIVE for adulteration. Spike – Samples for Creatinine are NEGATIVE for adulteration.

INTERFERENCE

The Evidence MultiSTAT DOA Urine Array was assessed for interference with the compounds listed in Table 5.

Method

- Two drug free urine samples were spiked, one at -50% of the cut off and one at +50% of the cut off
- The sample was divided and 1 portion was prepared containing the interferent
- These samples were then analysed on the Evidence MultiSTAT analyser against the cut off material to generate a positive or negative result.

No interference was observed from the compounds shown in Table 5.

Note: Creatinine interference is not applicable to the Creatinine assay.

Table 5. Interference assessed on the Evidence MultiSTAT DOA Urine Array.

Interference	Level Tested
Acetaminophen	1mg/ml
Acetone	1000mg/dl
Acetylsalicylic acid	1mg/ml
Ascorbic acid	1500mg/dl
Caffeine	1mg/ml
Creatinine	5mg/ml
Ethanol	1000mg/dl
Galactose	10mg/dl
Gamma globulin	500mg/dl
Glucose	3000mg/dl
Haemoglobin	300mg/dl
Human serum albumin	500mg/dl
Ibuprofen	1mg/ml
Oxalic acid	100mg/dl
Ranitidine	0.9 mg/ml
Riboflavin	7.5mg/dl
Sodium chloride	6000mg/dl
Urea	3500mg/dl

SPECIFICITY

The specificity for all analytes on the Evidence MultiSTAT DOA Urine Array was determined by identifying the concentration of a compound that would produce a positive response on the Evidence MultiSTAT DOA Urine Assays where analysed against the cut off material.

The specificity of each of the assays are shown in Tables 6 – 25 (**NOTE**: ND indicates no detection).

Table 6. Specificity of the Fentanyl Assay on Evidence MultiSTAT DOA Urine Array

Fentanyl Assay		
Compound	**Approximate Concentration to Read Positive (ng/ml)**	**Approximate % Cross Reactivity**
Fentanyl	2	100
para-fluorofentanyl	1.56	128.2
Thiofentanyl HCL	1.82	110
α-methylfentanyl	3	66.7
Furanylethylfentanyl	3	66.7
Butrylfentanyl	3.5	57
Benzylfentanyl	6	33.5
Methoxyacetyl fentanyl	8.4	23.8
Ortho Fluro Fentanyl	8.4	23.8
Acrylfentanyl	9	22.2
Meta-hydroxy-acrylfentanyl	9.6	20.8
Thienyl Fentanyl	12.6	15.9
Isobutyrylfentanyl	14.5	13.8
Furanylfentanyl	14.5	13.8
Norfentanyl	19.2	10.42
Valeryl Fentanyl	35	5.7
Cyclopentylfentanyl	57.6	3.5
Ocfentanil	60	3.3
(±)-trans-3-methyl Fentanyl	60	3.3
ω-hydroxyfentanyl	64.5	3.1
Ohmefentanyl	70	2.9
cis-Mefentanyl HCl Salt	80	2.5
3-Methylthiofentanyl	85	2.4
Norfuranylfentanyl	120	1.67
Acetylfentanyl	200	<1
4-Fluorobutyrfentanyl / Para Fluoroisobutrylfentanyl	400	<1
Norocfentanyl	200	<1
ω-Hydroxy norfentanyl	670	<1
Remifentanyl	ND	ND

Table 7. Specificity of the EthylGlucuronide Assay on Evidence MultiSTAT DOA Urine Array

EthylGlucuronide Assay		
Compound	**Approximate Concentration to Read Positive (ng/ml)**	**Approximate % Cross Reactivity**
Ethyl glucuronide	750	100
Methylethyl glucuronide	1000	75
Methyl- βD-glucuronide	14000	5.4

Table 8. Specificity of the Methamphetamine Assay on Evidence MultiSTAT DOA Urine Array

Methamphetamine Assay		
Compound	**Approximate Concentration to Read Positive (ng/ml)**	**Approximate % Cross Reactivity**
S(+)-Methamphetamine	200	100
PMMA HCl	100	200
MDMA	300	66.7
BDB	20000	1
D-Amphetamine	ND	ND
Fenfluramine	ND	ND
(±) MDA	ND	ND
Phenteramine	ND	ND
PMA	ND	ND
R(-) Methamphetamine	ND	ND

Table 9. Specificity of the Barbiturates Assay on Evidence MultiSTAT DOA Urine Array

Barbiturates Assay		
Compound	**Approximate Concentration to Read Positive (ng/ml)**	**Approximate % Cross Reactivity**
Phenobarbital	200	100
Secobarbital	130	153
Pentobarbital	145	138
Butabarbital	145	138
Cyclopentobarbital	255	78
Amobarbital	475	42.1
Barbital	605	33.1
Butalbital	750	26.7

Table 10. Specificity of the Benzodiazepines I Assay on Evidence MultiSTAT DOA Urine Array

Benzodiazepines I Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Oxazepam	150	100
Alprazolam	3.125	4800
Diazepam	6.24	2403.8
alpha-hydroxyalprazolam	7.5	2000
Estazolam	7.5	2000
Prazepam	15	1000
Nordiazepam	24.5	612.24
Temazepam	28.8	520.8
Midazolam	43.75	342.86
Triazolam	49.2	304
Clobazam	60	250
2-OH Ethylflurazepam	60	250
Flurazepam	100	150
Nitrazepam	115	130
Medazepam	220	68.18
Lorazepam	300	50
Chlordiazepoxide	575	26
Bromazepam	850	17.6
N-Desmethylflunitrazepam	885	16.9
Clonazepam	2150	7
7-Aminonitrazepam	3900	3.85
Lorazepam Glucuronide	15000	<1
7-NH Clonazepam	ND	ND
Oxazepam Glucuronide	ND	ND
Temazepam Glucuronide	ND	ND

Table 11. Specificity of the Benzodiazepines II Assay on Evidence MultiSTAT DOA Urine Array

Benzodiazepines II Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Lorazepam	150	100
Oxazepam	300	50
Clonazepam	900	16.7
Lorazepam Glucuronide	1200	12.5
Nordiazepam	2750	5.45
N-Desmethylflunitrazepam	3750	4
Alprazolam	15000	<1
Oxazepam Glucuronide	18720	<1
Flurazepam	150000	<1
7-Aminonitrazepam	ND	ND
Bromazepam	ND	ND
Chlordiazepoxide	ND	ND
Clobazam	ND	ND
7-NH Clonazepam	ND	ND
Diazepam	ND	ND
Estazolam	ND	ND
2-OH Ethylflurazepam	ND	ND
alpha-hydroxyalprazolam	ND	ND
Lormetazepam	ND	ND
Medazepam	ND	ND
Midazolam	ND	ND
Nitrazepam	ND	ND
Prazepam	ND	ND
Temazepam	ND	ND
Temazepam Glucuronide	ND	ND
Triazolam	ND	ND

Table 12. Specificity of the Methadone Assay on Evidence MultiSTAT DOA Urine Array

Methadone Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Methadone	300	100
EDDP Perchlorate	30000	<1

Table 13. Specificity of the Opiates Assay on Evidence MultiSTAT DOA Urine Array

Opiate Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Morphine	200	100
Heroin	15	1333.3
6-Acetylmorphine	20	1000
Codeine	325	61.5
6-Acetylcodeine	400	50
Morphine-3βD-Glucuronide	1500	13.3
Desomorphine	2000	10
Dihydrocodeine	3500	5.7
Hydrocodone	4200	4.8
Levorphanol	5000	4
Morphine-6βD-Glucuronide	6000	3.3
Thebaine	7000	2.9
Hydromorphone	10,000	2
Oxycodone	20,000	<1
Dextromethorphan	ND	ND
Meperidine	ND	ND
Norcodeine	ND	ND
Normorphine	ND	ND
Noroxycodone HCl	ND	ND
Noroxymorphone HCl	ND	ND

Table 14. Specificity of the BZG/Cocaine Assay on Evidence MultiSTAT DOA Urine Array

BZG/Cocaine Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Benzoylecgonine	150	100
Cocaine	100	150
m-hydroxybenzoylecgonine	210	71.4
Ecgonine HCl	ND	ND
Norcocaine HCl	ND	ND

Table 15. Specificity of the Oxycodone Assay on Evidence MultiSTAT DOA Urine Array

Oxycodone Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Noroxycodone	50	100
Hydrocodone	19.5	256.4
Oxycodone	34	147
6-Acetylcodeine	20,000	<1
Codeine	ND	ND
Desomorphine	ND	ND
Dextromethorphan	ND	ND
Dihydrocodeine	ND	ND
Heroin	ND	ND
Hydromorphone	ND	ND
Levorphanol	ND	ND
Meperidine	ND	ND
Morphine-3βD-Glucuronide	ND	ND
Morphine-6βD-Glucuronide	ND	ND
Norcodeine	ND	ND
Normorphine	ND	ND
Noroxymorphone HCl	ND	ND
Oxymorphone	ND	ND
Thebaine	ND	ND

Table 16. Specificity of the Tramadol Assay on Evidence MultiSTAT DOA Urine Array

Tramadol Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Tramadol	5	100
O-Desmethyltramadol HCl	32	15.6
(±) N-Desmethyltramadol HCl	390	1.3

Table 17. Specificity of the Tricyclic Antidepressants (TCA) Assay on Evidence MultiSTAT DOA Urine Array

Tricyclic Antidepressants (TCA) Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Nortriptyline	150	100
Imipramine N-oxide	15	1000
Imipramine	50	300
Amitriptyline	52.5	285.8
Trimipramine	63	238
Cyclobenzapine	74.7	201
Desipramine	80	187.5
Promazine	85.5	175.4
Opipramol	89.8	167
Doxepin	105	142.8
Maprotiline	155	96.8
Dothiepin	200	75
Protriptyline	223.9	67
Cyproheptadine	230	65.2
Lofepramine	258.7	58
Clomipramine	270	55.5
Norclomipramine HCL	560	26.8
Nordoxepin	625	24
Chlorpromazine	625	24
2-hydroxyimipramine	769.2	19.5
Perphenazine	867.1	17.3

Table 18. Specificity of the Cannabinoids Assay on Evidence MultiSTAT DOA Urine Array

Cannabinoids (THC) Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
(-)-11-nor-9-Carboxy-Δ^9-THC	20	100
delta 9-THC	200	10
(±)-11-hydroxy-delta-9-THC	275	7.3
delta 8-THC	500	4
Cannabidiol	2000	<1

Table 19. Specificity of the Amphetamine Assay on Evidence MultiSTAT DOA Urine Array

Amphetamine Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
S(+)-Amphetamine	200	100
(±) MDA	60	333
PMA HCl	85	235
BDB	180	111
D-Amphetamine	240	83.3
Phentermine	875	22.9
Fenfluramine	ND	ND
PMMA HCl	ND	ND
R(-) Methamphetamine	ND	ND

Table 20. Specificity of the Buprenorphine Assay on Evidence MultiSTAT DOA Urine Array

Buprenorphine Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
Norbuprenorphine	1	100
Buprenorphine HCL	8	12.5
Norbuprenorphine-3βD-Glucuronide	8.6	11.7
Buprenorphine-3βD-Glucuronide	65	1.6

Table 21. Specificity of the 6-MAM Assay on Evidence MultiSTAT DOA Urine Array

6-MAM Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
6-Acetylmorphine	10	100
Heroin	200	5
6-Acetylcodeine	3,000	<1
Oxycodone	20,000	<1
Codeine	ND	ND
Desomorphine	ND	ND
Dextromethorphan	ND	ND
Dihydrocodeine	ND	ND
Hydrocodone	ND	ND
Hydromorphone	ND	ND
Levorphanol	ND	ND
Meperidine	ND	ND
Morphine	ND	ND
Morphine-3βD-Glucuronide	ND	ND
Morphine-6βD-Glucuronide	ND	ND
Norcodeine	ND	ND
Normorphine	ND	ND
Noroxycodone HCl	ND	ND
Noroxymorphone HCl	ND	ND
Oxymorphone	ND	ND
Thebaine	ND	ND

Table 22. Specificity of the Synthetic Cannabinoids (UR-144) Assay on Evidence MultiSTAT DOA Urine Array

Synthetic Cannabinoids (UR-144) Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
UR-144 N-Pentanoic Acid	10	100
UR-144 N-(5-hydroxypentyl) metabolite	6	167
(±)-UR-144 N-(4-hydroxypentyl) metabolite	8.5	118
UR-144 N-(5-hydroxypentyl)-βD-Glucuronide	9.5	105
A-834735	10	100
A-796260	11.5	87
XLR-11 N-(4-pentyl) analog	51	19.7
XLR-11	53	18.9
AB-005	56	17.9
UR-144 N-(5-chloropentyl) analog	58	17.2
UR144 Desalkyl	58.5	17
XLR-11 N-(2-fluoropentyl) isomer	80	12.5
UR-144 N-(5-bromopentyl) analog	125	8
UR-144 N-(heptyl) analog	126	7.9
UR-144	130	7.7

Table 23. Specificity of the AB-PINACA Assay on Evidence MultiSTAT DOA Urine Array

AB-PINACA Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
AB-PINACA N-Pentanoic acid	2.5	100
5-Fluoro AB-PINACA	1.75	143
5-Hydroxypentyl AB-PINACA	2.5	100
AB-PINACA	3.5	71.4
4-Hydroxypentyl AB-PINACA	5	50
5-Fluoro AB-PINACA N-(4-hydroxypentyl) metabolite	6	41.7
ADB-PINACA N-(5-hydroxypentyl) metabolite	8	31.3
ADB-PINACA pentanoic acid metabolite	11	22.8
AB-FUBINACA	89.7	2.8

Table 24. Specificity of the Synthetic Cannabinoids (JWH-018) Assay on Evidence MultiSTAT DOA Urine Array

Synthetic Cannabinoids (JWH-018) Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
JWH 018 N-pentanoic acid metabolite	20	100
AM2201 N-(4-fluoropentyl) isomer	5	400
JWH 018 N-(5-hydroxypentyl) metabolite	5	400
JWH 073 N-(4-hydroxybutyl) metabolite	7	286
AM2201	7	285.8
JWH 073	7.2	277.8
(±)-JWH 018 n-(4-hydroxypentyl) metabolite	7.5	266.7
JWH-200	8.5	235
JWH 018 N-(5-hydroxypentyl) β-D-glucuronide	9.6	208.3
JWH 073 6-hydroxyindole metabolite	10	200
JWH-018	10	200
JWH 018 6-methoxyindole analog	11	181.9
AM1220	11.5	174
JWH 022	12	166.7
JWH 200 6-hydroxyindole metabolite	12.25	163.2
AM2201 N-(4-hydroxypentyl metabolite)	14.5	138
JWH 073 N-(2-methylpropyl) isomer	15	133.3
JWH-073 N-Butanol	16	125
JWH 018 6-hydroxyindole metabolite	16	125
(1-(4-Carboxybutyl)-1H-indol-3-yl) (naphthalene-1-yl) methanone (N-carboxybutyl) JWH-018	17.8	112.3
JWH 073 5-hydroxyindole metabolite	18	111.1
AM2201 6-hydroxyindole metabolite	20	100
JWH 018 5-hydroxyindole metabolite	20	100

Table 24. Specificity of the Synthetic Cannabinoids (JWH-018) Assay on Evidence MultiSTAT DOA Urine Array (Continued)

JWH018 N-(1,2-dimethylpropyl) isomer	20	100
JWH 019 N-(6-hydroxyhexyl) metabolite	20	100
JWH 073 7-hydroxyindole metabolite	20.5	97.6
JWH 018 7-hydroxyindole metabolite	22	90.9
JWH 018 N- (2-methylbutyl) isomer	22.5	88.9
JWH 018 N- (1-methylbutyl) isomer	36	55.6
JWH 018 N- (2,2-dimethylpropyl) isomer	37.4	53.4
JWH 073 N-(1-methylpropyl) isomer	40	50
JWH 019 5-hydroxyindole metabolite	40	50
JWH 200 5-hydroxyindole metabolite	50	40
JWH 398 N-(5-hydroxypentyl) metabolite	52	38.4
JWH 020	59	33.9
JWH 073 N-butanoic acid metabolite	83.5	24
JWH 122 N-(5-hydroxypentyl) metabolite	90	22.2
JWH-424	100	20
JWH-018 4-hydroxyindole metabolite	120	16.7

Table 25. Specificity of the alpha-PVP Assay on Evidence MultiSTAT DOA Urine Array

alpha-PVP Assay		
Compound	Approximate Concentration to Read Positive (ng/ml)	Approximate % Cross Reactivity
α-Pyrrolidinovalerophenone	5	100
Naphyrone HCl	3.5	143
MDPV HCl	7	71.4
Butylone HCl	ND	ND
Methedrone HCl	ND	ND
Methylone HCl	ND	ND
MDPPP HCl	ND	ND

Table 26. Specificity of the Creatinine Assay on Evidence MultiSTAT DOA Urine Array

Creatinine Assay		
Compound	Approximate Concentration to Read Positive (mg/dL)	Approximate % Cross Reactivity
Creatinine	20	100

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