

Appendices

Appendix A: Site Selection Procedures

For this study, we sought already collected urine specimens from patients that had visited two hospital emergency departments with a suspected SC overdose. Specimens were collected directly from the hospital laboratories using any remaining volume after all hospital testing was complete. All specimens were de-identified before transferring them to CESAR for the study. The participating hospitals also agreed to complete a linked de-identified patient form which included relevant medical record data on the patient’s hospital visit for their suspected overdose. Using a specified protocol, specimens were prepared by the hospital staff and sent to the CDEWS laboratory.

Emergency Department Patients, Prince George’s Hospital Center (PGHC)

The Emergency Department at PGHC tests its specimens for a limited eight-drug panel (amphetamines, barbiturates, benzodiazepines, cocaine, marijuana, methamphetamine, opiates, and PCP) using its own on-site laboratory. Negotiations and approval for this site took approximately one month (see Table A-1). The UMCP and PGHC IRB applications were then submitted and approved. Specimen collection took approximately nine months.

Emergency Department Patients, University of Maryland Medical Center, Midtown Campus

UMMC tests its specimens for a limited seven-drug panel (amphetamine, barbiturates, benzodiazepines, cocaine, marijuana, opiates, and PCP) using its own on-site laboratory. Methadone and buprenorphine were tested upon request. Negotiations and approval for this site took approximately two months (see Table A-1). The University of Maryland, College Park (UMCP) and UMMC IRB applications were then submitted and approved. Specimen collection took approximately eight months.

Table A-1: Time to Obtain Approval and Collect Specimens On-Site

Site	Time to Obtain Approval	Researcher Time On-Site Collecting Specimens
Emergency Department, Prince George’s Hospital Center	1 month	3 days
Department of Emergency Medicine, University of Maryland Medical Center, Midtown Campus	2 months	3 days

Appendix B: Collection of Urine Specimens

Specimens for the study were obtained by participating hospital staff using excess volume from specimens already collected by the hospitals for clinical purposes. Specimens for the study were obtained after all hospital testing was complete. Only specimens with a minimum volume of 10mL were included in the study. The results of the toxicology screening from the participating hospitals were not obtained as part of this study.

Emergency Department Patients, Prince George's Hospital Center (PGHC)

Over the period of approximately nine months (January to October 2016), Emergency Department staff at the PGHC identified specimens for possible inclusion in the study. Hospital staff began by identifying patients with known or suspected SC overdose (i.e., patients who exhibited agitation, presented with evidence of SC use such as self-report or paraphernalia, or whose chief complaint was related to SC). Patients were enrolled in the study if they had not been seen by the Emergency Department at PGHC for a complaint related to SC prior to the start of the study, and if they had provided a urine specimen to the hospital laboratory. ED staff then collected a urine specimen for these patients and recorded information from the patient's medical record, (i.e., presenting symptoms, vital signs, past drug/medication use, mental status, interventions/medications administered, etc.) in order to link the patient's clinical presentation with the CDEWS laboratory screen results (see Figure B-1). These de-identified patient medical record data information forms were then transferred to CESAR with a temporary study ID that corresponded to the urine specimen for that same patient. Selected specimens were then assigned a permanent study ID by CESAR staff in order to fully blind the specimens and then packaged and shipped to the CDEWS collaborating laboratory. We collected 106 specimens from this hospital site.

Emergency Department Patients, University of Maryland Medical Center, Midtown Campus

Over the period of approximately eight months (February to September 2016), physicians at UMMC identified specimens for possible inclusion in the study. Hospital staff began by identifying patients with a known or suspected SC overdose (i.e., patients who exhibited agitation, presented with evidence of SC use, such as self-report or paraphernalia, or whose chief complaint was related to SC). Patients were selected for the study based on these criteria rather than on the basis of their urine toxicology results given that the hospital panel only tests for a limited panel of seven drugs. Patients were enrolled in the study if they had not been seen by the Department of Emergency Medicine at UMMC for a complaint related to SC prior to the start of the study, and if they had provided a urine specimen to the hospital laboratory. ED staff then collected a urine specimen for these patients and recorded information from the patient's medical record, (i.e., presenting symptoms, vital signs, past drug/medication use, mental status, interventions/medications administered, etc.) in order to link the patient's clinical presentation with the CDEWS laboratory screen results (see Figure B-2). These de-identified patient medical record data information forms were then transferred to CESAR with a temporary study ID that corresponded to the urine specimen for that same patient. Selected specimens were then assigned a permanent study ID by CESAR staff in order to fully blind the specimens and packaged and shipped to the CDEWS collaborating laboratory. We collected 69 specimens from this hospital site.

Figure B-1: Data Information Form for Obtaining Clinical Patient Data for Prince George's Hospital Center

Community Drug Early Warning System (CDEWS-3) Study Data Information Form – Prince George's Hospital Center

Name of ED Staff Member Completing this Form: _____

Patient Eligibility Screener

1) Is the patient exhibiting any of the following? (Check all that apply):

- Agitation – due to suspected synthetic cannabinoid use or undefined cause.
- Evidence of synthetic cannabinoid use (check all that apply):
 - Patient reports recent synthetic cannabinoid use
 - Paraphernalia found on patient
 - Police/EMS/bystander report synthetic cannabinoid use
 - MD/RN suspicion
 - Other (specify): _____
- Chief complaint related to synthetic cannabinoids (e.g., "I smoked K2")

Any of the above? Continue to eligibility question #2. N/A →

STOP. Patient is ineligible for the study. Check the box for this question and provide this form to the study coordinator. Do not complete the remainder of the form.

2) Has the patient been seen at Prince George's Hospital Center prior to this admission for a complaint related to synthetic cannabinoids since January 18, 2016?

- Yes _____
- No – continue to eligibility question #3.

3) Is there a urine specimen available for the patient that is 10mL or greater?

- No _____
- Yes – patient is eligible for the study. Please complete the "Patient Form" on the back of this page and select the urine specimen for the study using the "Urine Specimen Collection Protocol". Provide completed form to the study coordinator.

Please provide completed forms for both eligible and ineligible participants to the Study Coordinator.

Questions about the study? Contact the Study Coordinator, _____ at _____ or _____ (Put "PG Hospital SC study" in the Subject line).

Notes:

PLACE STUDY ID
LABEL HERE

CONFIDENTIAL: DO NOT WRITE THE PATIENT NAME ON THIS FORM

Patient Form – Prince George’s Hospital Center

Specimen Collection Date (MM/DD/YY): / /

Brought in by: Police EMS Walk-in/Self-referral Other: _____

Chief Complaint: OD/Poisoning AMS EPS Petition/Psych Found down Fall Pedestrian-struck
 MVC Other: _____

Time of Patient Arrival to ED (✓ applicable): 6am-12pm 12pm-6pm 6pm-12am 12am-6am

PATIENT HISTORY – DRUG/MEDICATION USE

What synthetic cannabinoid did the patient take (if known)? _____

Treating provider’s level of certainty that patient used a synthetic cannabinoid: 1 2 3 4 5
UNCERTAIN CERTAIN

Per patient’s self-report or report by other representative:

Do not record patient’s specific urine toxicology results on this form!

Patient consumed alcohol in the past 24 hours? Yes No Unknown

Patient used illicit drug(s) within the past 24 hours? (✓ all that apply):

- Marijuana Cocaine Heroin Benzodiazepines Morphine Codeine
- PCP Amphetamines Oxycodone Oxymorphone Buprenorphine Methadone
- Synthetic Cannabinoid Other (specify): _____ None Unknown

List of prescribed medications taken regularly (specify): _____

DEMOGRAPHIC INFORMATION

Age: Sex: Male Female

Race: White Black/African-American
 Asian Native Hawaiian/Other Pacific Islander
 American Indian/Alaskan Native
 Other: _____

Ethnicity: Hispanic Non-Hispanic

Zip Code of Residence:

OTHER CLINICAL INFORMATION

Rhythm on Monitor (✓ applicable):

- NSR Sinus tach Bradycardia VT
- VF A Fib Other: _____

Metabolic Symptoms:

Creatinine: _____ mg/dL

Creatinine levels from prior hospital admission (if available):

Date (mm/dd/yy): ____/____/____ Level: _____ mg/dL

Creatinine Kinase (CK): _____ U/L

Lactic Acid: _____ mmol/L Ethanol Level: _____ mg/dL

Interventions Administered:

- Physical restraints
- Cardiac: Monitor Paced Defibrillation
- Oxygen: Cannula Mask Intubation

Medications Administered:

Narcan / Did it have an effect? Yes No

Benzodiazepines/Antipsychotics/Other Drugs (fill applicable):

Drug	Route	Dose(s) Given (units)

Vasopressors Magnesium IV fluids: _____

TRIAGE VITALS

Heart Rate: _____ beats/min Temperature: _____ °F

Respiratory Rate: _____ breaths/min

Blood Pressure: _____ / _____ Pulse Ox: _____ %

MENTAL STATUS ON ARRIVAL

- Anxious Agitated Hallucinating
- Fluctuating Other: _____

of Seizures (✓): 1 2-3 ≥4 Status Epilepticus

GCS: ____ E + ____ V + ____ M = ____ Total

Eye Opening	Verbal	Motor
4 = Spontaneous	5 = Normal	6 = Normal
3 = Opens to voice	4 = Disoriented	5 = Localizes to pain
2 = Opens to pain	3 = Words, incoherent	4 = Withdraws from pain
1 = None	2 = Incomprehensible	3 = Decorticate
	1 = None	2 = Decerebrate
		1 = None

Disposition: ED Length of Stay: _____ (hours): _____ (minutes)

(✓): DC Med/Surg Psych Tele ICU Other: _____ Transfer (Why?): _____

ED Course (specify, if not covered above): _____

Other Comments: _____

(Use other side if necessary)

Figure B-2: Data Information Form for Obtaining Clinical Patient Data for University of Maryland Medical Center, Midtown Hospital

Community Drug Early Warning System (CDEWS-3) Study Data Information Form – Midtown

Name of ED Staff Member Completing this Form: _____

Patient Eligibility Screener

1) Is the patient exhibiting any of the following? (Check all that apply):

- Agitation – due to suspected synthetic cannabinoid use or undefined cause.
- Evidence of synthetic cannabinoid use (check all that apply):
 - Patient reports recent synthetic cannabinoid use
 - Paraphernalia found on patient
 - Police/EMS/bystander report synthetic cannabinoid use
 - MD/RN suspicion
 - Other (specify): _____
- Chief complaint related to synthetic cannabinoids (e.g., "I smoked K2")

Any of the above? Continue to eligibility question #2. N/A →

STOP. Patient is ineligible for the study. Check the box for this question and provide this form to the study coordinator. Do not complete the remainder of the form.

2) Has the patient been seen at UMD-Midtown ED prior to this admission for a complaint related to synthetic cannabinoids since January 25, 2016?

- Yes _____
- No – continue to eligibility question #3.

3) Is there a urine specimen available for the patient that is 10mL or greater?

- No _____
- Yes – patient is eligible for the study. Please complete the "Patient Form" on the back of this page and select the urine specimen for the study using the "Urine Specimen Collection Protocol". Provide completed form to the study coordinator.

Please provide completed forms for both eligible and ineligible participants to the Study Coordinator.

Questions about the study? Contact the Study Coordinator, _____, at _____ or _____ (Put "Midtown SC study" in the Subject line).

Notes:

PLACE STUDY ID LABEL HERE

CONFIDENTIAL: DO NOT WRITE THE PATIENT NAME ON THIS FORM

Patient Form – Midtown

Specimen Collection Date (MM/DD/YY): [] [] / [] [] / [] []

Brought in by: [] Police [] EMS [] Walk-in/Self-referral [] Other: _____

Chief Complaint: [] OD/Poisoning [] AMS [] EPS Petition/Psych [] Found down [] Fall [] Pedestrian-struck [] MVC [] Other: _____

Time of Patient Arrival to ED (✓ applicable): [] 6am-12pm [] 12pm-6pm [] 6pm-12am [] 12am-6am

PATIENT HISTORY – DRUG/MEDICATION USE

What synthetic cannabinoid did the patient take (if known)? _____

Treating provider's level of certainty that patient used a synthetic cannabinoid: 1 2 3 4 5
UNCERTAIN CERTAIN

Per patient's self-report or report by other representative:

Patient consumed alcohol in the past 24 hours? [] Yes [] No [] Unknown

Do not record patient's specific urine toxicology results on this form!

Patient used illicit drug(s) within the past 24 hours? (✓ all that apply):

- [] Marijuana [] Cocaine [] Heroin [] Benzodiazepines [] Morphine [] Codeine
[] PCP [] Amphetamines [] Oxycodone [] Oxymorphone [] Buprenorphine [] Methadone
[] Synthetic Cannabinoid [] Other (specify): _____ [] None [] Unknown

List of prescribed medications taken regularly (specify): _____

DEMOGRAPHIC INFORMATION

Age: [] [] Sex: [] Male [] Female

Race: [] White [] Black/African-American [] Asian [] Native Hawaiian/Other Pacific Islander [] American Indian/Alaskan Native [] Other: _____

Ethnicity: [] Hispanic [] Non-Hispanic

Zip Code of Residence: [] [] [] [] []

OTHER CLINICAL INFORMATION

Rhythm on Monitor (✓ applicable):

- [] NSR [] Sinus tach [] Bradycardia [] VT [] VF [] A Fib [] Other: _____

Metabolic Symptoms:

Creatinine: _____ mg/dL

Creatinine levels from prior hospital admission (if available):

Date (mm/dd/yy): ____/____/____ Level: _____ mg/dL

Creatine Kinase (CK): _____ U/L

Lactic Acid: _____ mmol/L Ethanol Level: _____ mg/dL

Interventions Administered:

- [] Physical restraints Cardiac: [] Monitor [] Paced [] Defibrillation Oxygen: [] Cannula [] Mask [] Intubation

Medications Administered:

[] Narcan / Did it have an effect? [] Yes [] No

Benzodiazepines/Antipsychotics/Other Drugs (fill applicable):

Table with 3 columns: Drug, Route, Dose(s) Given (units)

[] Vasopressors [] Magnesium [] IV fluids: _____

TRIAGE VITALS

Heart Rate: _____ beats/min Temperature: _____ °F

Respiratory Rate: _____ breaths/min

Blood Pressure: _____ / _____ Pulse Ox: _____ %

MENTAL STATUS ON ARRIVAL

- [] Anxious [] Agitated [] Hallucinating [] Fluctuating [] Other: _____

of Seizures (✓): [] 1 [] 2-3 [] ≥4 [] Status Epilepticus

GCS: ____ E + ____ V + ____ M = ____ Total

Table with 3 columns: Eye Opening, Verbal, Motor. Includes scales for 4, 3, 2, 1 for each category.

Disposition: ED Length of Stay: _____ (hours): _____ (minutes)

(✓): [] DC [] Med/Surg [] Psych [] Tele [] ICU [] Other: _____ [] Transfer (Why?): _____

ED Course (specify, if not covered above): _____

Other Comments: _____

(Use other side if necessary)

Appendix C: Testing of Urine Specimens by the CDEWS Laboratory

Armed Forces Medical Examiner System Laboratory

CESAR contracted with the Armed Forces Medical Examiner System Laboratory for testing, as this laboratory has a shared mission to identify emerging drugs for testing in the United States. The drugs and metabolites included in the CDEWS panel were selected after interviewing 14 chemists at seven labs to identify new psychoactive substances (NPS) to consider adding to our panel and to assess the availability of tests for these drugs (see Table C-1 below). We also reviewed data and information from multiple international, national and local sources before finalizing the testing panel. All specimens were held in cold storage for the duration of the study. Over 160 drugs were tested for using Liquid Chromatography-Tandem Mass Spectrometry (LC/MS/MS). The test results, labeled by study ID, were sent electronically to CESAR.

Selecting Substances for Inclusion in the Testing Panel

Selecting substances to include in the study test panel was critical to the ability of the study to detect emerging drugs, particularly as related to NPS, an area of fast-paced change in terms of availability and use.

To plan our test panel, we reviewed data and information from multiple international, national and local sources. These included a review of the 2015 National data from the Drug Enforcement Administration's (DEA) National Forensic Laboratory Information System (NFLIS), special data runs for 2015 provided by the DEA's Special Testing and Research Laboratory, as well as reports from the United Nations Office on Drugs and Crime (UNODC) Early Warning Advisories, and other sources (Baumann, 2016; Head, 2016; Logan, 2016; NMS Labs, 2015; UNODC, Early Warning Advisory, 2016; U.S. DEA, Office of Diversion Control, 2015; U.S. DEA, Office of Diversion Control, NFLIS, 2016d; U.S. DEA, Special Testing and Research Laboratory, Emerging Trends Program, 2016a, 2016b). We also reviewed data from participating CDEWS jurisdictions and other local data to assess local drug trends (Booze, 2016; Indiana State Epidemiology and Outcomes Workgroup, 2014; Keenan, 2016; Polhemus, 2016; Shewmaker, 2016; U.S. DEA, Office of Diversion Control, NFLIS, 2016a, 2016b, 2016c).

In addition, we interviewed 14 chemists at seven labs prior to finalizing the test panel. The persons interviewed were selected from existing networks of toxicologists with expertise in the area of NPS and/or urine testing that we have identified from past CDEWS studies, as well as through other professional networks. We also identified contacts through referrals from our existing network of toxicologists, researchers, and law enforcement representatives. A standard set of questions was asked including:

- What specific substances do you think are most important for us to include in our testing panel?
- Are there any new or emerging synthetic drugs that we should include?
- What synthetic drugs do you test for at your agency?

- What synthetic cannabinoid metabolites have you been finding in your most recent specimens? cathinones? other synthetic drugs?
- To your knowledge, are there tests available for each of these drugs? What would be the recommended test (EIA, LC/MS, etc.)?

Table C-1: Toxicologists Interviewed for CDEWS

NAME	TITLE/AFFILIATION
Dr. Gregory Endres; Dr. Donna Iula	Cayman Chemical
Jerome Robinson; Dr. Felix Adatsi	Pretrial Services Agency for the District of Columbia
Jill Head; Emily Dye	Special Testing and Research Laboratory, Drug Enforcement Administration
Lt. Niki Crawford	Indiana State Police
Sgt. Ryan Johnson	Kentucky State Police Crime Laboratory
Dr. Karl Scheidweiler	National Institute on Drug Abuse, National Institutes of Health Biomedical Research Center
Dr. (CDR) Thomas Bosity; Dr. Jeffrey Walterscheid; LCDR Pedro Ortiz; Dr. Paul Kaiser; Theresa Hippolyte	Armed Forces Medical Examiner System

Based on the information reviewed, we added 26 additional new psychoactive substances to our previous CDEWS-3 designer drug screen: 2C-B-FLY, 4-Fluoroamphetamine (4-FA), 4-Fluoromethamphetamine (4-FMA), 4-AAP (Dipyrone metabolite), 4-ANPP (Despropionyl fentanyl), 5-MEO-MiPT, 5-APDB/6-APDB, Betahydroxythiofentanyl, Bromo-DragonFLY, Butyryl Fentanyl, Dibutylone, Dimethylone, DMT, Furanylfentanyl, MT-45, Parafluorobutyryl fentanyl, Parafluorofentanyl, Psilocin, 2C-T, U-47700, W-15, W-18, Loperamide, 4-MAAP (Dipyrone metabolite), DHNK (Ketamine metabolite), and Ketamine. (see Table C-2 in Appendix for the full panel). Several additional NPS were identified as relevant to the study but were not included due to lack of test availability and cost. Dipyrone is a prescription drug (sometimes mixed with fentanyl) and Loperamide is an over-the-counter drug subject to abuse (Eggleston et al., 2017; Mian, 2014; Saint Louis, 2016; U.S. FDA, 2016). Several SC metabolites of interest were identified, but reference standards for many of them were not available at the time of the study, and therefore could not be included in the test panel.

Synthetic Cannabinoid Testing

In our initial testing for SC, we were surprised to find that only one specimen from PGHC and no specimens from UMMC tested positive for an SC, despite patients being enrolled in the study for a suspected SC overdose. Given this unexpected result, we delayed reporting of the study results to allow time for the CDEWS Laboratory to update the SC testing panel so that the specimens could be re-tested for additional SC metabolites. Given the rapidly changing nature of the composition of NPS drugs, such as SC, we wanted to examine the possibility that some SC use may have been missed by the original test panel. In November 2017, the SC testing panel was updated to include additional SC metabolites. Table C-3 details the 26 SC metabolites included as part of the original SC testing conducted in November-December 2016, as well as the 46 SC metabolites contained on the updated

SC test panel that was utilized for the SC re-testing in November 2017. The results of this re-testing are compared to the initial testing in Table C-4 below.

Table C-2: The CDEWS Laboratory Expanded Drug Screening Panel and Limits of Detection

SYNTHETIC CANNABINOID PANEL

	COMPOUND	LOD (ng/mL)		COMPOUND	LOD (ng/mL)
1	5F-AB-PINACA	0.2	26	JWH-018-N-COOH	0.2
2	5F-AB-PINACA N-OH*	0.2	27	JWH-019-N-OH	0.2
3	5F-ADB metabolite 7*	0.2	28	JWH-073-N-COOH	0.2
4	5F-AKB-48 N-OH	0.2	29	JWH-081-N-OH	0.2
5	5F-AMB*	0.2	30	JWH-122-N-OH	0.2
6	5F-AMB metabolite 7*	0.2	31	JWH-210-N-OH	0.2
7	5F-APINACA*	0.2	32	JWH-210-N-COOH*	0.2
8	5F-PB-22 3-carboxyindole	0.2	33	JWH-250-N-OH	0.2
9	AB-CHMINACA (Parent)	0.2	34	JWH-250-N-COOH*	0.2
10	AB-CHMINACA (metab 4)	0.2	35	MA-CHMINACA *	0.2
11	AB-CHMINACA (metab 6)	0.2	36	MAB-CHMINACA metabolite M2*	0.2
12	AB-FUBINACA (Parent)	0.2	37	MAM-2201-N-COOH/JWH-122- COOH	0.2
13	AB-FUBINACA (metab 2)*	0.2	38	MDMB-CHMICA *	0.2
14	AB-PINACA N-COOH	0.2	39	MDMB-FUBICA metabolite 3*	0.2
15	ADB-FUBINACA (Parent)	0.2	40	MDMB-FUBINACA metabolite M1*	0.2
16	ADBICA-N-COOH	0.2	41	MMB-CHMICA *	0.2
17	ADB-PINACA-N-COOH	0.2	42	MMB-FUBINACA *	0.2
18	AKB-48-N-COOH	0.2	43	PB-22 3-carboxyindole	0.2
19	AM-2201-N-OH	0.2	44	RCS-4-N-COOH	0.2
20	BB-22 3-carboxyindole	0.2	45	UR-144-N-COOH	0.2
21	FUB-144*	0.2	46	XLR-11-N-OH	0.2
22	FUB-AKB-48*	0.2			
23	FUB-JWH-018*	0.2			
24	FUB-PB-22*	0.2			
25	FUB-PB-22 3-carboxyindole metabolite*	0.2			

*Indicates that the synthetic cannabinoid metabolite was included in the second round of re-testing of the specimens only.

Table C-2 (Cont'd): The CDEWS Laboratory Expanded Drug Screening Panel and Limits of Detection

DESIGNER PANEL

	COMPOUND	LOD (ng/mL)		COMPOUND	LOD (ng/mL)
1	25B-NBOMe	5	31	α-PVP	5
2	25I-NBOMe	5	32	Mephedrone	5
3	25C-NBOMe	5	33	Methedrone	5
4	2C-B	5	34	Methylone	5
5	2C-B-FLY	5	35	Parafluorobutyryl fentanyl	5
6	4-Fluoroamphetamine (4-FA)	5	36	Parafluorofentanyl	5
7	4-Fluoromethamphetamine (4-FMA)	5	37	Pentedrone	5
8	4-AAP (Dipyrone metabolite)	5	38	Pentylone	5
9	4-ANPP (Despropionyl fentanyl)	5	39	TFMPP	5
10	4-Methylethcathinone (4-MEC)	5	40	Phentermine	5
11	5-MEO-MiPT	5	41	B-Methylphenethylamine	5
12	5-APDB/6-APDB	5	42	Trazodone	5
13	Betahydroxythiofentanyl	5	43	Psilocin	5
14	Bromo-DragonFLY	5	44	Naphyrone	5
15	Buphedrone	5	45	Mitragynine	5
16	Butylone	5	46	Methoxetamine (MXE)	5
17	Butyryl Fentanyl	5	47	PMMA	5
18	Benzylpiperazine	5	48	2C-T	5
19	Cathinone	5	49	Flephedrone	5
20	Dibutylone	5	50	Methiopropamine	5
21	Dimethylone	5	51	U-47700	5
22	DMT	5	52	W-15	5
23	Methcathinone/Ephedrone	5	53	W-18	5
24	Ethylone	5	54	Loperamide	5
25	Eutylone	5	55	4-MAAP (Dipyrone metabolite)	5
26	Furanylfentanyl	5	56	DHMK (Ketamine metabolite)	5
27	mCPP	5	57	Ketamine	5
28	MBDB	5	58	2C-T-7	5
29	MDPV	5	59	Carfentanil	5
30	MT-45	5			

THC/BUPRENORPHINE/LSD PANEL

	COMPOUND	LOD (ng/mL)
1	THC-COOH	5
2	Buprenorphine	1
3	Norbuprenorphine	1
4	Naloxone	1
5	LSD/Metabolite (2-oxo-3-hydroxy-LSD)	0.05/.25

Table C-2 (Cont'd): The CDEWS Laboratory Expanded Drug Screening Panel and Limits of Detection

GENERAL PANEL

	COMPOUND	LOD (ng/mL)		COMPOUND	LOD (ng/mL)
1	6-Monoacetylmorphine (6-MAM)	5	41	Hydroxyzine	25
2	7-Aminoclonazepam	25	42	Ketamine	25
3	Acetylfentanyl	1	43	Lorazepam	25
4	Alprazolam	25	44	MDA	25
5	Amitriptyline	25	45	MDEA	25
6	Amphetamine	25	46	MDMA	25
7	Atomoxetine	25	47	Meperidine	25
8	Benzoyllecgonine (Cocaine)	25	48	Methadone	25
9	Bupropion	25	49	Methamphetamine	25
10	Carisoprodol	50	50	Methylphenidate	25
11	Cetirizine	25	51	Morphine	25
12	Chlorpromazine	25	52	Naloxone	25
13	Citalopram	25	53	Nordiazepam	25
14	Clonazepam	25	54	Norfentanyl	4
15	Codeine	25	55	Normeperidine	25
16	Cyclobenzaprine	25	56	Nortriptyline	25
17	Demoxepam	25	57	Oxazepam	25
18	Desalkflurazepam	25	58	Oxycodone	25
19	Desomorphine	25	59	Oxymorphone	25
20	Desvenlafaxine	25	60	Paroxetine	25
21	Dextromethorphan	25	61	PCP	10
22	Diazepam	25	62	Phenmetrazine	25
23	Diclazepam	25	63	Phenazepam	25
24	Doxepin	25	64	Prazepam	25
25	Duloxetine	25	65	Promethazine	25
26	EDDP	25	66	Pseudoephedrine	25
27	Ephedrine	25	67	Pyrazolam	25
28	Estazolam	25	68	Propoxyphene	25
29	Etizolam	25	69	Quinidine	25
30	Fentanyl	1	70	Quinine	25
31	Flubromazepam	25	71	Sertraline	25
32	Flunitrazepam	25	72	Tapentadol	25
33	Fluoxetine	25	73	Temazepam	25
34	Flurazepam	25	74	Thioridazine	25
35	Haloperidol	25	75	Tramadol	25
36	Hydrocodone	25	76	Venlafaxine	25
37	Hydromorphone	25	77	Zaleplon	5
38	α -Hydroxyalprazolam	25	78	Zolpidem	5
39	α -Hydroxymidazolam	5	79	Zopiclone	5
40	α -Hydroxytriazolam	25			

Table C-3: Synthetic Cannabinoid Metabolites Tested for on the Initial Test and/or the Re-test Panel

Synthetic Cannabinoid Metabolite	Initial Test (Nov-Dec 2016)	Re-test (Nov 2017)
5F-AB-PINACA	✓	✓
5F-AKB-48 N-OH	✓	✓
5F-PB-22 3-carboxyindole	✓	✓
AB-CHMINACA (Parent)	✓	✓
AB-CHMINACA (metab 4)	✓	✓
AB-CHMINACA (metab 6)	✓	✓
AB-FUBINACA (Parent)	✓	✓
AB-PINACA N-COOH	✓	✓
ADB-FUBINACA (Parent)	✓	✓
ADBICA-N-COOH	✓	✓
ADB-PINACA-N-COOH	✓	✓
AKB-48-N-COOH	✓	✓
AM-2201-N-OH	✓	✓
BB-22 3-carboxyindole	✓	✓
JWH-018-N-COOH	✓	✓
JWH-019-N-OH	✓	✓
JWH-073-N-COOH	✓	✓
JWH-081-N-OH	✓	✓
JWH-122-N-OH	✓	✓
JWH-210-N-OH	✓	✓
JWH-250-N-OH	✓	✓
MAM-2201-N-COOH/JWH-122-COOH	✓	✓
PB-22 3-carboxyindole	✓	✓
RCS-4-N-COOH	✓	✓
UR-144-N-COOH	✓	✓
XLR-11-N-OH	✓	✓
5F-AB-PINACA N-OH		✓
5F-ADB metabolite 7		✓
5F-AMB		✓
5F-AMB metabolite 7		✓
5F-APINACA		✓
AB-FUBINACA (metab 2)		✓
FUB-144		✓
FUB-AKB-48		✓
FUB-JWH-018		✓
FUB-PB-22		✓
FUB-PB-22 3-carboxyindole metabolite		✓
JWH-210-N-COOH		✓
JWH-250-N-COOH		✓
MA-CHMINACA		✓
MAB-CHMINACA metabolite M2		✓
MDMB-CHMICA		✓
MDMB-FUBICA metabolite 3		✓
MDMB-FUBINACA metabolite M1		✓
MMB-CHMICA		✓
MMB-FUBINACA		✓
Total Number of SC Metabolites on Panel	26	46

Note: ✓ denotes that metabolite was included on the test panel.

Table C-4: Number of Specimens Containing Synthetic Cannabinoid Metabolites in the Initial and/or Re-test

Synthetic Cannabinoid Metabolite	Initial Test (Nov-Dec 2016)	Re-Test [^] (Nov 2017)		
	Total (N=175) <i>f</i>	Prince George's Hospital Center (N=106) <i>f</i>	UMMC, Midtown Campus (N=69) <i>f</i>	Total (N=175) <i>f</i>
5F-PB-22 3-carboxyindole	1 [‡]	2	0	2
AB-CHMINACA (metab 4)	0	1	0	1
ADB-FUBINACA (Parent)	0	0	1	1
BB-22 3-carboxyindole	0	1	0	1
JWH-073-N-COOH	0	2	0	2
PB-22 3-carboxyindole	0	1	0	1
MDMB-FUBINACA metabolite M1	*	17	14	31
MMB-FUBINACA	*	10	1	11
5F-AMB metabolite 7	*	7	0	7
FUB-PB-22 3-carboxyindole metabolite	*	0	3	3
5F-ADB metabolite 7	*	2	0	2
Total Number of Synthetic Cannabinoid Positive Specimens	1	43	19	62

[^]Upon re-testing the specimens for a larger panel of synthetic cannabinoids, in some cases where the same tests were applied during both the initial test and re-test, we detected positives for SC metabolites at the time of re-test that had shown as negative at the time of our initial testing. This may be due to the use of a more robust method at the time of re-testing.

[‡]Detected in specimen from Prince George's Hospital Center.

*Metabolite was not included on the drug panel at the time of testing.

Appendix D: Glossary of Abbreviated Terms

6-MAM: 6-Monoacetylmorphine, a unique metabolite of heroin used to definitively determine heroin use

CDEWS: Community Drug Early Warning System

CESAR: Center for Substance Abuse Research

DEA: Drug Enforcement Administration

EIA: Enzyme Immunoassay, a method of urine drug testing

IRB: Institutional Review Board at the University of Maryland, a committee that must approve all human subjects research at the University of Maryland

LC/MS: Liquid Chromatography/Mass Spectrometry, a method for confirming drug positives in urine

LC/MS/MS: Liquid Chromatography-Tandem Mass Spectrometry, a method for confirming drug positives in urine

LSD: Lysergic Acid Diethylamide, a hallucinogen

MDMA: 3,4-methylenedioxy-N-methylamphetamine, also known as ecstasy or Molly

NFLIS: National Forensic Laboratory Information System

NIDA: National Institute on Drug Abuse

ONDCP: Office of National Drug Control Policy

PCP: Phencyclidine, a dissociative anesthetic and hallucinogen

PGHC: Prince George's Hospital Center

SC: Synthetic Cannabinoid, also known as synthetic marijuana, K2, or spice

THC: Tetrahydrocannabinol, the primary active ingredient in marijuana

UM: University of Maryland

UMMC: University of Maryland Medical Center, Midtown Campus