DEA TOX

DRUG ENFORCEMENT ADMINISTRATION

TOXICOLOGY TESTING PROGRAM

QUARTERLY REPORT

4th Quarter – 2021

U.S. Department of Justice
Drug Enforcement Administration
Diversion Control Division
Drug and Chemical Evaluation Section

Contents

Introduction

The Drug Enforcement Administration's Toxicology Testing Program (DEA TOX) began in May 2019 as a surveillance program aimed at detecting new psychoactive substances within the United States. In response to the ongoing synthetic drug epidemic, the Drug Enforcement Administration (DEA) awarded a contract with the University of California at San Francisco (UCSF) to analyze biological samples generated from overdose victims of synthetic drugs.

In many cases, it can be difficult to ascertain the specific substance responsible for the overdose. The goal of DEA TOX is to connect symptom causation to the abuse of newly emerging synthetic drugs (e.g. synthetic cannabinoids, synthetic cathinones, new synthetic opioids, other hallucinogens, etc.).

DEA has reached out to local health departments, law enforcement partners, poison centers, drug court laboratories, hospitals and other medical facilities, to offer testing of leftover or previously collected samples for analysis of synthetic drugs. DEA TOX is interested in patients thought to have ingested a synthetic drug, where the traditional drug screen has produced little or no viable options to explain the symptoms exhibited by the patient (alcohol and THC are exempted). DEA TOX may approve leftover un-used biological samples (or biological samples) for testing from a medical facility or law enforcement partner only.

Once DEA TOX is contacted (**DEATOX@DEA.GOV**) and upon approval by DEA of the request for testing of specific samples, the originating laboratory is invited to send their samples to the Clinical Toxicology and Environmental Biomonitoring (CTEB) Laboratory at UCSF. DEA covers the full cost of analysis for each sample approved for testing. Using liquid chromatography- quadrupole time-of-flight mass spectrometry, synthetic drugs identified within the samples are confirmed and quantified. The CTEB laboratory currently maintains a comprehensive drug library consisting of the following:

912 new psychoactive substances (**NPS**);
161 traditional illicit drugs (**TID**);
93 prescription or over-the-counter (**OTC**) drugs;
15 dietary supplement stimulants (**DSS**); and
Multiple precursor chemicals, additives or impurities (**P/A/I**)

This publication presents the results of cases analyzed and completed by the CTEB laboratory from October 1, 2021 through December 31, 2021.

What's New?

We have added a new section entitled "Drug Paraphernalia"

- In some instances, further testing of drug paraphernalia associated with an overdose has been requested. These results, when available, will now be included along with the drug breakdown and quantification of NPS identified.

Summary

Between October 1, 2021 through December 31, 2021, 115 biological samples from 97 cases and five drug paraphernalia exhibits from two cases originating from ten states namely Florida (2), Georgia (3), Kentucky (29), Massachusetts (2), North Carolina (4), Ohio (36), Pennsylvania (1), Tennessee (20), Texas (1), and Washington (1) were submitted to DEA TOX. These samples were analyzed for NPS, TID, prescription or OTC drugs, DSS, and P/A/I. The biological samples submitted consisted of 13 serum, 17 plasma, 22 whole blood, and 63 urine samples.

DEA TOX identified and confirmed a total of 755 drugs and metabolites that consisted of 80 NPS detections, 302 TID detections, 343 prescription or OTC drug detections, 5 DSS detections, and 25 P/A/I detections during this reporting period (Fig. 1A). While some drugs identified could be placed in more than one category, for purposes of this report and for consistency, DEA TOX placed such substances in a single category only. Substances that are not approved by the Food and Drug Administration for medical use within the U.S. are considered NPS.

A breakdown of the 755 total drug and metabolite confirmations demonstrated 98 different drugs, which consisted of 18 NPS, 15 TID, 60 prescription and OTC drugs, 2 DSS, and 3 P/A/I (Fig. 1B).

Fig. 1A Detection frequency

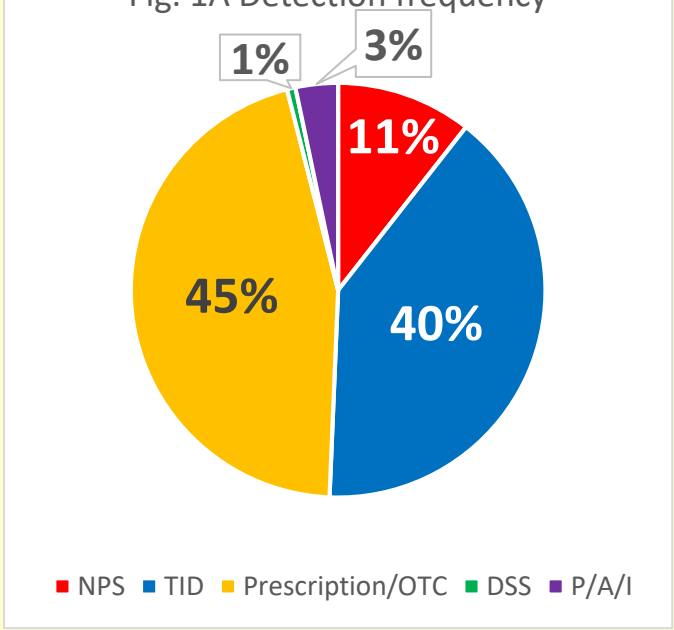
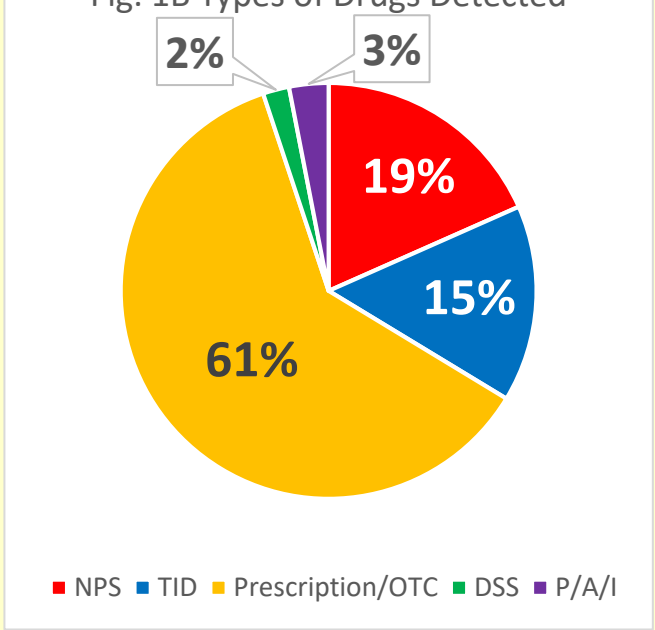


Fig. 1B Types of Drugs Detected



New Psychoactive Substances

DEA TOX confirmed 69 detections comprising of 17 NPS[§] (Table 1) from six different classes of drugs (Figure 2A) in the fourth quarter of 2021. The total encounters for each NPS class are summarized in Figure 2B.

Figure 2A. Number of Substances Identified for Each NPS Class

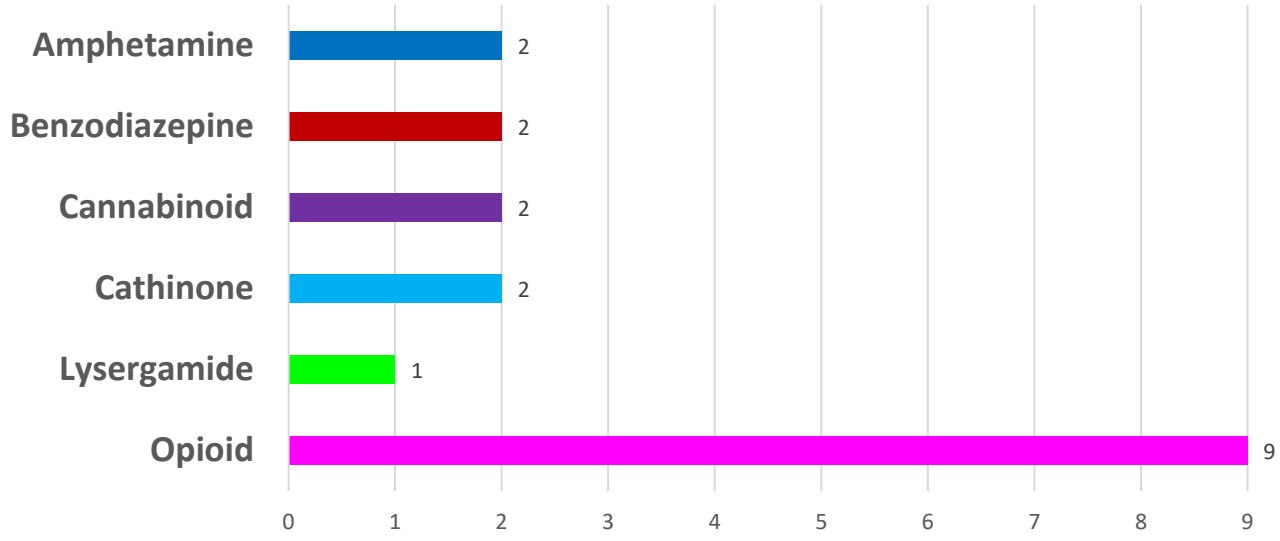


Figure 2B. Total Encounters for Each NPS Class

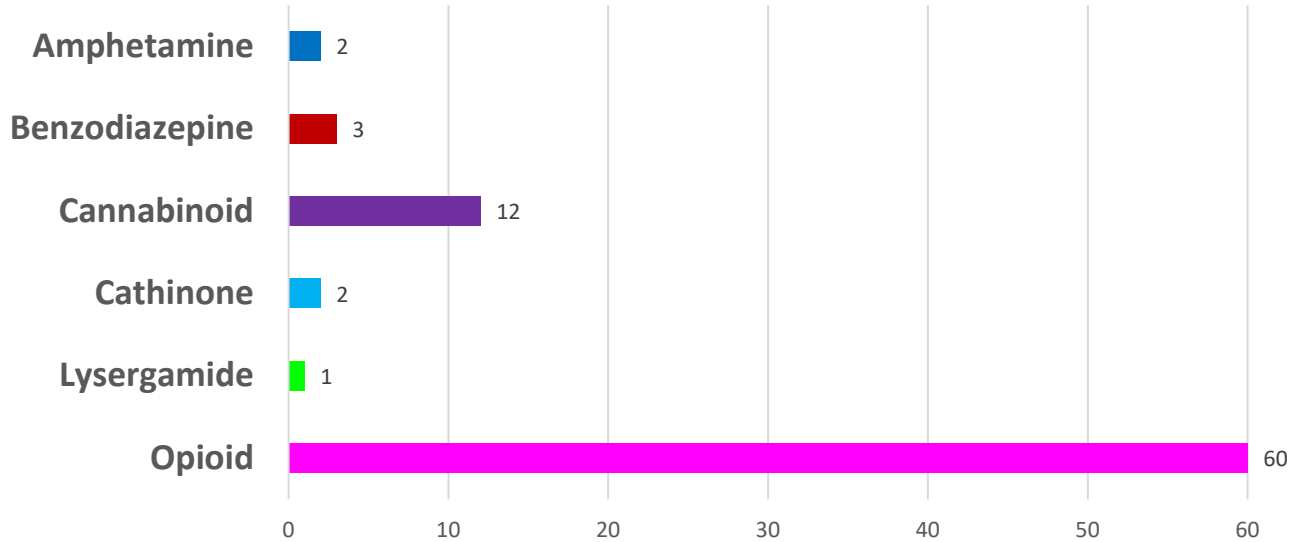


Table 1. NPS detected – Fourth Quarter 2021

Drug Class	Drug	Freq.	States Found*	Confirmed Levels (ng/mL)**			
				S	P	WB	U
Amphetamine	3,4-DMMA	1	TN			0.1	
	Ethylamphetamine	1	OH				177
Benzodiazepine	Bromazolam	1	TN			4.2	
	Etizolam	2	GA, NC	0.4-55.6			
Cathinone	Alpha-pyrrolidinohexano-phenone (a-PHP)	1	TN			182	
	Eutylone	1	GA	20.8			
Lysergamide	LAMPA	1	MA	6.4			4.1
Opioids	2-Methyl-AP-237	1	WA			313	
	Acetyl Fentanyl	2	OH, TN			3.4	1580
	Beta-hydroxy Fentanyl	18	KY(2), OH(13), TN(3)		0.3	0.4-1.1	9.8-1480
	Metonitazene	8	TN(8)			0.7-16.5	
	Mitragynine	4	NC, TN(2), WA	40.9		0.8-60.4	229
	N-Piperidinyl Etonitazene	2	TN(2)			0.4-2.1	
	N-Pyrrolidino Etonitazene	1	TN			4.1	
	para-Fluoro fentanyl	13	GA, OH(4), TN(8)	4.8		0.6-82	20.3-399
	7-OH Mitragynine	1	NC				58.8
	Acetyl Norfentanyl	3	OH(3)				16.3-826
	Despropionyl para-fluoro fentanyl	4	TN(4)			0.1-1.6	
	N-Methyl Norfentanyl	2	OH(2)				11.9-25.2
	Norsufentanil	1	OH				3360
Synthetic cannabinoid	ADB-BUTINACA	1	KY		3.7		

* GA – Georgia; KY – Kentucky; MA – Massachusetts; NC – North Carolina; OH – Ohio; TN – Tennessee; WA – Washington

**S- Serum; P-Plasma; WB- Whole Blood; U-Urine

Traditional Illicit Drugs

DEA TOX confirmed 302 detections comprising of 15 TIDs[§] (Table 2) in the fourth quarter of 2021.

Table 2. TID detected – 4th Quarter 2021

Drug Class	Drug	Freq.	States Found*	Confirmed Levels (ng/mL)**			
				S	P	WB	U
Amphetamines	Amphetamine	17	KY(9), OH(3), TN(5)	126	42.5-79.3		2210-173000
	Methamphetamine	26	KY(9), NC(1), OH(7), TN(9)	36.6-62.8	312-999	1.0-2480	14.2-172000
	4-Hydoxymeth-amphetamine	9	KY(6), NC, OH, TN			37.1	29.7-1230
	HMMA[‡]	2	KY(2)				3.5-19.5
Arylcyclohexyl-amines	Ketamine	4	KY(4)		20.4		6040
	Phencyclidine	2	OH(2)				8.2-77.9
Cannabinoids	11-nor-9-carboxy-delta-9-THC	20	KY(10), NC(2), OH (7), PA	37.8-107	53.6-250		47.8-6860
Cocaine	Cocaine	23	GA, KY(3), NC, OH(17), TN	6.4		87.3	9-24300
	Benzoylecgonine	36	GA(2), KY(6), MA, NC, OH(23), TN(3)	13.2-3770	4.5-85.2	1.1-1620	10.1-148000
	Cocaethylene	5	KY(2), OH(3)				NQ
	Ecgonine methyl ester	26	GA(2), KY(3), MA, NC, OH(18), TN	NQ	NQ	NQ	NQ
Opioids	Codeine	7	OH(6), TN			0.2	7.4-642
	Fentanyl	44	GA, KY(10), NC(2), OH(16), TN (15)	0.4-5.5	3.7	1.2-29.5	2.7-8750
	Hydrocodone	4	KY, OH(2), TN			29.5	182-480
	Hydromorphone	7	KY(6), OH		20.6		8.8-523
	Morphine	19	NC, OH(12), TN(6)			0.6-5.8	4.8-45600
	Oxycodone	3	KY, OH(2)		3.5		167-9520
	Oxymorphone	2	OH(2)				62.1-277
	6-acetyl morphine	7	OH(7)				19.8-391
	Norfentanyl	39	KY(10), NC(2), OH(20), PA, TN(6)		3.4	0.5-4.7	2.9-62700

* GA – Georgia; KY – Kentucky; MA – Massachusetts; NC – North Carolina; OH – Ohio; PA – Pennsylvania; TN – Tennessee; TX – Texas; WA – Washington

**S- Serum; P-Plasma; WB- Whole Blood; U-Urine; NQ – Not Quantified

‡ 4-Hydroxy-3-methoxymethamphetamine

Prescription and Over the Counter Drugs

DEA TOX confirmed 343 detections comprising of 60 prescription or OTC drugs[§] (Table 3) in the fourth quarter of 2021.

Table 3. Prescription or OTC drugs detected – 4th Quarter 2021

Drug Class	Drug	Freq.	States Found*
Anesthetic	Lidocaine	16	KY(3), MA, OH(3), TN(9)
Antibiotic	Sulfomethoxazole	2	KY(2)
Anticonvulsant	Gabapentin	8	KY(3), TN(5)
	Lamotrigine	3	KY(2), NC
	Levetiracetam	1	KY
	Oxcarbazepine	1	OH
	Phenytoin	1	KY
Antidepressant	Amitriptyline	3	KY(3)
	Nortriptyline	3	KY(3)
	Bupropion	1	OH
	Citalopram	5	KY(2), OH, TN, WA
	Doxepin	1	TN
	Duloxetine	2	OH, TN
	Fluoxetine	8	KY(3), MA, OH(2), TN, WA
	Norfluoxetine	6	KY, MA, OH(2), TN, WA
	mCPP**	8	KY, MA, OH(4), TN(2)
	Paroxetine	1	OH
	Sertraline	2	OH(2)
	Trazodone	8	KY, MA, OH(4), TN(2)
	Venlafaxine	1	OH
Antidiabetic	Metformin	1	OH
Antidiarrheal	Loperamide	2	OH, TN
Antihistamine	Chlorpheniramine	1	MA
	Diphenhydramine	29	GA(2), KY(4), NC, OH(12), TN(9), TX
	Hydroxyzine	7	KY, NC(2), OH(3), TN
	Promethazine	1	TN
Antipsychotic	Aripiprazole	2	NC, OH
	Haloperidol	3	NC, TN, TX
	Olanzapine	3	NC, OH, TN

Drug Class	Drug	Freq.	States Found*
Benzodiazepine	Alprazolam	3	KY, TN(2)
	Alpha-hydroxy Alprazolam	1	KY
	Clonazepam	2	KY, OH
	7-amino Clonazepam	3	KY(2), OH
	Diazepam	1	KY
	Nordiazepam	1	KY
	Lorazepam	13	KY(6), MA, NC(3), OH(2), TX
	Midazolam	13	KY(11), NC, OH
	Mirtazapine	5	MA, OH(4)
	Oxazepam	3	KY, OH(2)
	Temazepam	2	KY,TN
Cardiovascular	Amiodarone	1	TN
	Atorvastatin	2	MA, OH
	Atropine	2	KY, MA
	Carvedilol	2	OH, TN
	Clonidine	3	KY(2), OH
	Furosemide	1	KY
	Hydrochlorothiazide	1	OH
	Lisinopril	5	KY(2), OH(3)
	Metoprolol	4	MA, OH(3)
	Propanolol	2	KY, MA
	Verapamil	1	OH, TN
Cough Suppressant	Dextromethorphan	8	KY(3), MA, NC, OH, PA, TN
	Dextrorphan	7	KY(2), MA, NC, OH, PA, TN
Decongestant	Norpseudoephedrine	7	KY(3), OH(3), TN
	Phenylephrine	1	KY
	Pseudoephedrine	6	KY(5), TN
Muscle Relaxant	Baclofen	4	KY, NC, OH(2)
	Cyclobenzaprine	3	KY, MA, TN
Opioid	Buprenorphine	6	KY, OH(4), TN
	Norbuprenorphine	4	KY, OH(3)
	Naloxone	26	GA, KY(12), NC(2), OH(3), TN(7), WA
	Naltrexone	1	KY
	Tramadol	14	KY, NC, OH(11), TN
	Desmethyl-cis-tramadol	4	KY, OH(3)
Pain Reliever	Acetaminophen	43	GA(2), KY(15), MA, NC, OH(19), PA, TN(4)
	Ibuprofen	1	NC
Respiratory	Albuterol	5	KY(2), OH(3)
Tuberculostatic	Levofloxacin	2	OH

*GA – Georgia; KY – Kentucky; MA – Massachusetts; NC – North Carolina; OH – Ohio; PA – Pennsylvania; TN – Tennessee; TX – Texas; WA – Washington

**mCPP is an expected metabolite of trazadone

Dietary Supplement Stimulants

DEA TOX confirmed five detections comprising of two DSS[§] (Table 4) in the fourth quarter of 2021.

Table 4. DSS detected – 4th Quarter 2021

Drug Class	Drug	Freq.	States Found*
Stimulant	Hordenine	3	OH
	Synephrine	2	GA, OH(2)

*GA – Georgia; OH – Ohio

Precursors/Additives/Impurities

DEA TOX confirmed 21 detections comprising of two P/A/I[§] (Table 5) in the fourth quarter of 2021.

Table 5. P/A/I detected – 4th Quarter 2021

Drug Class	Drug	Freq.	States Found*	Confirmed Levels (ng/mL)**			
				S	P	WB	U
Impurity	N,N-dimethylamphetamine	2	KY, TN			118	1510
Precursor	4-ANPP	19	KY, NC, OH(6), TN(11)			0.1-1.9	5.6-255

* KY – Kentucky; NC – North Carolina; OH – Ohio; TN – Tennessee

**S – Serum; P – Plasma; WB – Whole Blood; U – Urine.

Drug Paraphernalia

DEA TOX received 5 exhibits and confirmed 15 detections[§] (Table 6) in the fourth quarter of 2021.

Table 6. Drug Paraphernalia exhibits – 4th Quarter 2021

Drug Class	Drug	State Found*	Confirmed Levels mg of drug/g of drug product	Description of exhibit
Exhibit 1				
Additive/Anticoagulant[1]	Brodifacoum	FL	1.4	Green plant material
Synthetic Cannabinoid[2]	4F-MDMB-BUTICA	FL	7.9	Green plant material
Synthetic Cannabinoid[2]	ADB-BUTINACA	FL	0.38	Green plant material
Exhibit 2				
Additive/Anticoagulant[1]	Brodifacoum	FL	1.7	Green plant material
Synthetic Cannabinoid[2]	4F-MDMB-BUTICA	FL	3.9	Green plant material
Synthetic Cannabinoid[2]	ADB-BUTINACA	FL	0.32	Green plant material
Cathinone[2]	Eutylone	FL	0.14	Green plant material
Exhibit 3				
Synthetic Cannabinoid[2]	4F-MDMB-BUTICA	FL	6.1	Green plant material
Synthetic Cannabinoid[2]	ADB-BUTINACA	FL	0.21	Green plant material
Exhibit 4				
Additive/Anticoagulant[1]	Brodifacoum	FL	6.3	Green plant material
Synthetic Cannabinoid[2]	4F-MDMB-BUTICA	FL	0.58	Green plant material
Synthetic Cannabinoid[2]	ADB-BUTINACA	FL	0.061	Green plant material
Exhibit 5				
Additive/Anticoagulant[1]	Brodifacoum	FL	0.19	Green plant material
Synthetic Cannabinoid[2]	4F-MDMB-BUTICA	FL	3.1	Green plant material
Synthetic Cannabinoid[2]	ADB-BUTINACA	FL	1.1	Green plant material

1 – Substance included in Additive category for Figures 1A, 1B, 2A, and 2B

2 – Substance included in NPS category for Figures 1A, 2B, 2A, and 2B

* FL – Florida

§ - Parent drugs or metabolites are only counted once for the number of drugs detected in Tables 1-6. If only a metabolite is encountered in the absence of a parent drug, it will still be counted as a unique drug. Both parent drugs and metabolites are counted as detections.

Contact Information

We invite medical and law enforcement facilities to contact our program if you encounter an overdose of a suspected synthetic drug and desire to have any leftover biological samples (blood preferred) analyzed further for such synthetic substances.

- **Sample Qualifications:**
  - Patients thought to have ingested a synthetic drug, where the traditional drug screen has produced little or no viable options to explain the symptoms exhibited by the patient (alcohol and THC are exempted).

- **How to Contact Us and Send Your Samples:**
  - Once the above qualifications are satisfied:
    - Email **DEATOX@DEA.GOV** with a brief description of the case (including initial toxicology screen and history) and a request for testing.
    - DEA will respond to each inquiry, and if approved, will send the instructions for packing and shipping of sample(s) to UCSF.
      - The main reason for disapproval of a case would be the identification of substances including methamphetamine, heroin, fentanyl, cocaine, LSD, PCP etc. in a routine toxicology screening at your facility.
      - This program's goal is to connect symptom causation to abuse of newly emerging synthetic drugs (e.g. synthetic cannabinoids, synthetic cathinones, fentanyl-related substances, other hallucinogens etc.).
  - Ensure that you de-identify and label the sample with a numerical value, sex, date of birth or age, and the date and time the sample was collected in accordance with the labeling instructions (sent with shipping instructions).
  - Keep a master list of the patients and the numerical values you allocated to each sample at your institution.

- **Cost of Sample Analysis:**
  - DEA will cover the full cost of testing the patient samples.
    - The sender will only be responsible for paying for packing and shipping samples to UCSF.

- **Turn-around Time:**
  - Results are expected within three to four weeks of receipt of the sample at UCSF except in rare occurrences when a novel substance is identified.

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Clinical Toxicology
and Environmental Biomonitoring Laboratory

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