



# Kalamazoo Chemistry - Oral Fluid Drug Testing

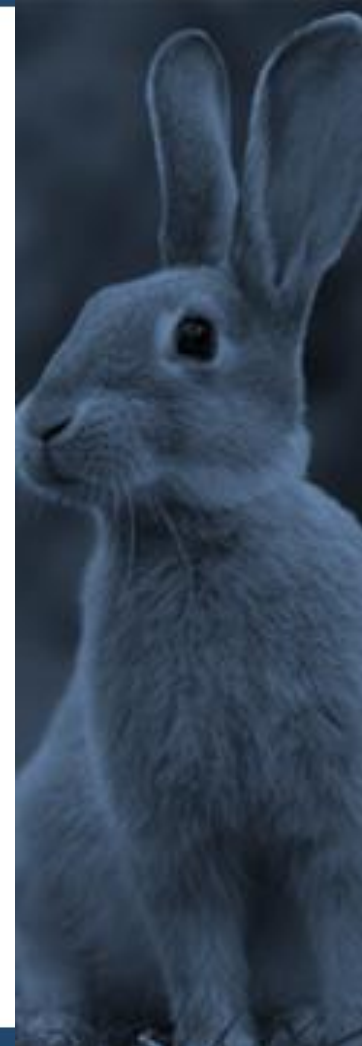
May 17th, 2019

**National Historic Chemical Landmark – Bridget Lorenz Lemberg  
Lab Director / Toxicologist**



# Forensic Fluids

- Opened in 2005 in the old Gibson Guitar building
- Started in 5,000sqft moved to 30,000 sqft in 2017
- Started with 1 employee, currently 78 employees
- Contracts with both MI DHHS, IN DCS, WIDHS and 60 ODJFS
- Perform drug testing in 27 States
- We detect drugs of abuse and Therapeutic drugs

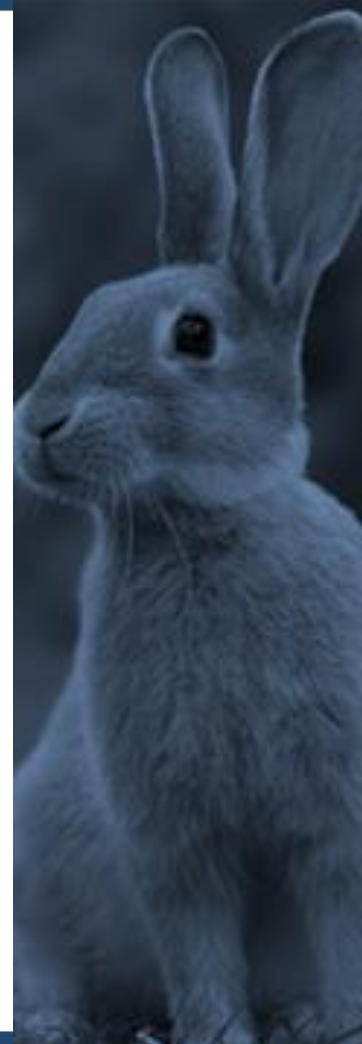


# Old Gibson Guitar home FFL



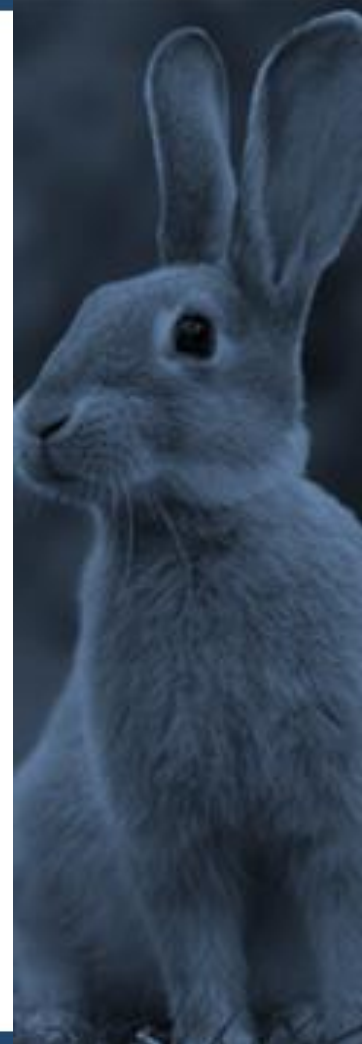
# Forensic Fluids

- 💧 Specializing in Oral Fluid drug testing since 2005
- 💧 Extensive Drug List – Over 140 compounds
- 💧 LC/MS/MS technology to confidently quantitate levels as low as 0.1ng/mL
- 💧 18 to 24 hour turnaround time
- 💧 Criminal Justice, MSP Roadside, and Healthcare
- 💧 We test over 2,000 samples per day



# Forensic Fluids

- 💧 Bridget Lorenz Lemberg – Lab Director/Toxicologist
- 💧 BS 1982 Food Science MS 1987 Toxicology UK
- 💧 Worked: KY State Police Crime Lab, South Bend Med Foundation (urine testing), CST & ASL oral fluid testing
- 💧 Married a WMU professor in December 2004
- 💧 Opened FFL 2005, I testify in court over 300 times a year
- 💧 FFL has published 3 papers and our Research focus: Lead Pb, Seizure Meds, Impairment, blood/oral correlation



# Drug Testing Options




## Oral Fluid and Blood and Breath

 Actual levels (immediate use, up to four days) \*



## Urine

 Measures metabolites /past use (several hours after use, up to four/five days) \*



## Meconium

 Chronic drug consumption in the last trimester of pregnancy \*



## Hair

 Indication of chronic use only, 1.5 inches of hair = 90 days \*

\* Peer reviewed papers available

# Window of Detection

## HYDROCODONE DETECTION PERIOD IN URINE, ORAL FLUID, AND BLOOD

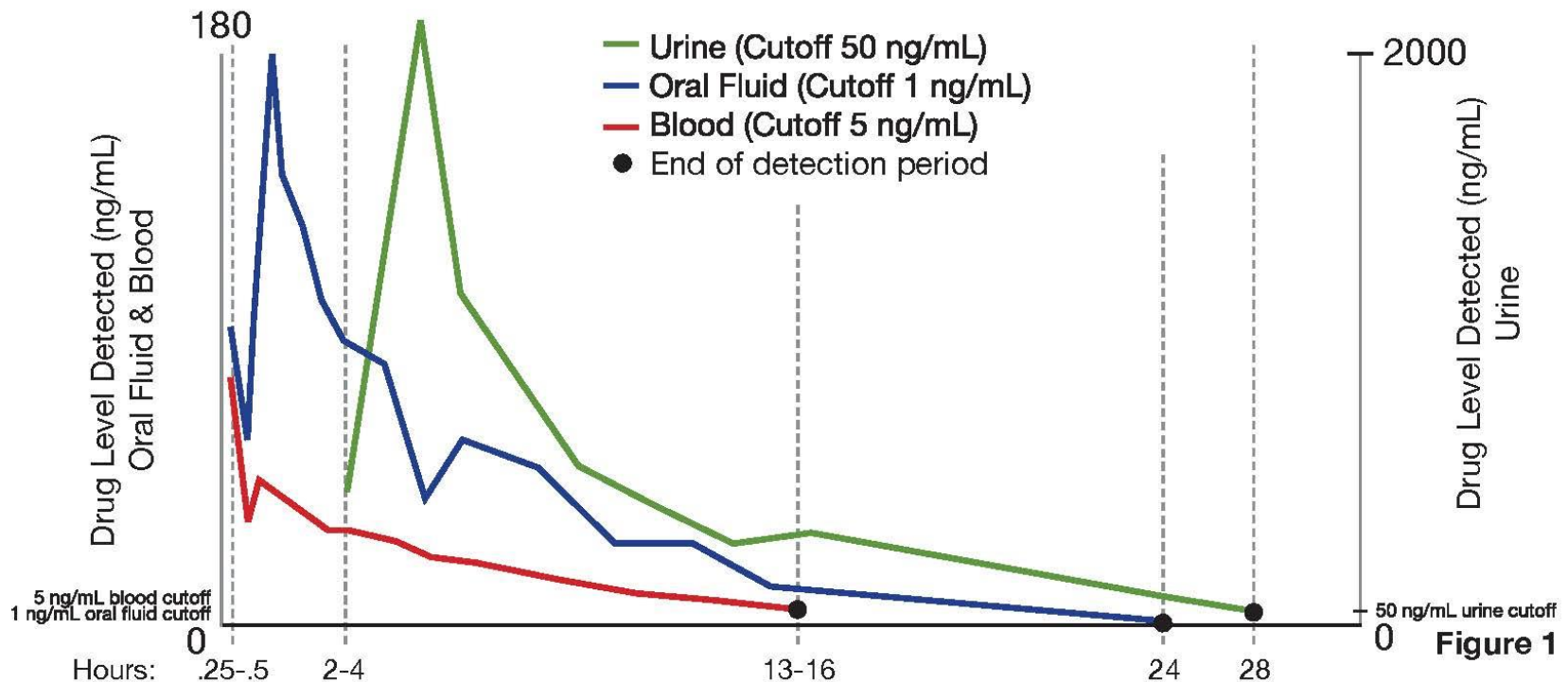





Figure 1



# Oral Fluid Testing

-  Non invasive, easily obtained, fast collection time, no facilities needed or specialize personnel, preserves dignity
-  Drug concentrations in saliva are proportional to drug concentrations in plasma/blood
-  If observed correctly, eliminates cheating





# Oral Fluid Lab Testing

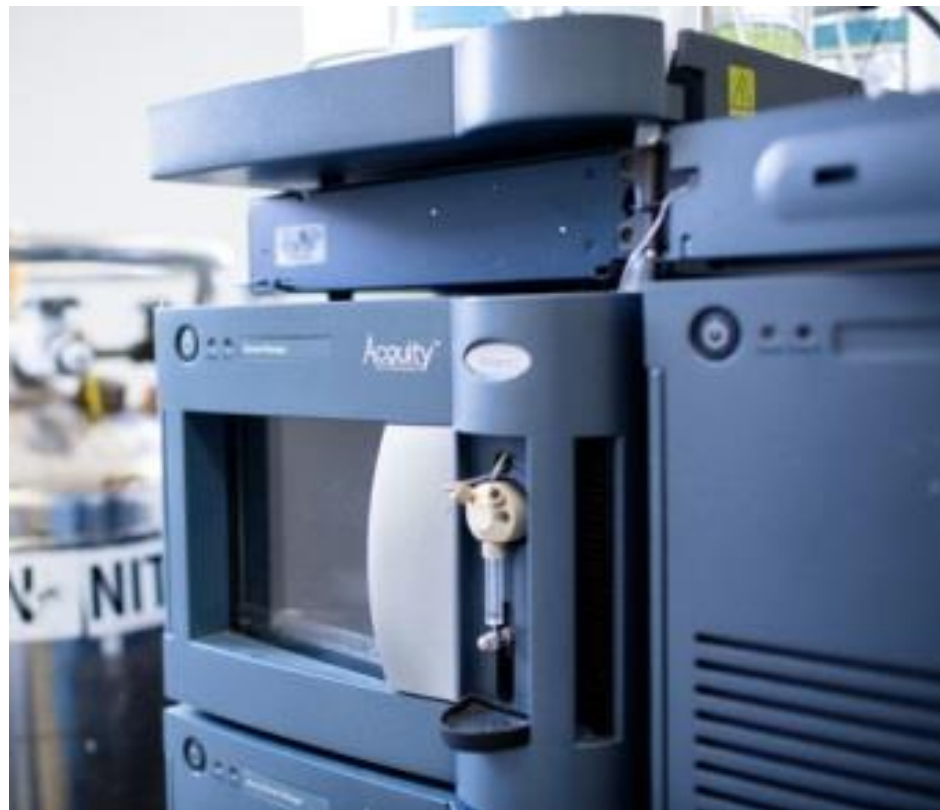
Screening Assays and LC/MS/MS Testing



# Technology



**Screening**



**Confirmation**

# Screening - Immunoassay

## 5 panel example:



AMPHETAMINE (Adderall, Vyvanse, MDA/Adam, Phentermine/Adipex)



METHAMPHETAMINE (MDMA/Ecstasy, Methcathinone)



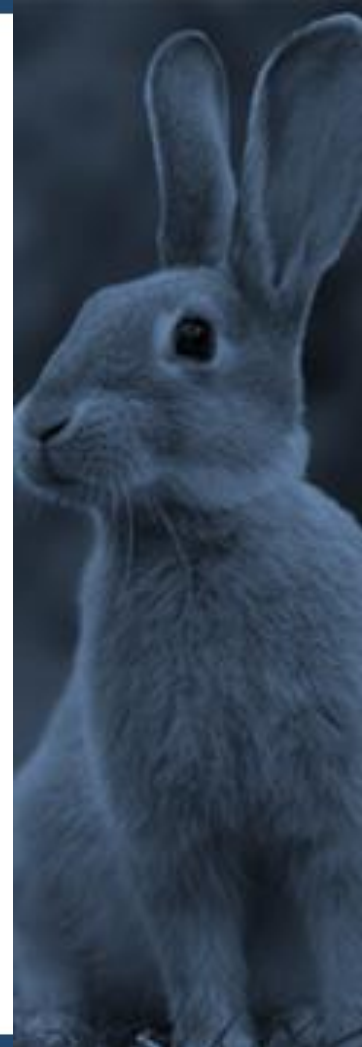
OPIATES (Heroin/6MAM, Morphine, Codeine)



COCAINE (Cocaine, Benzoyllecgonine, Ecgonine methyl ester, Cocaethylene)

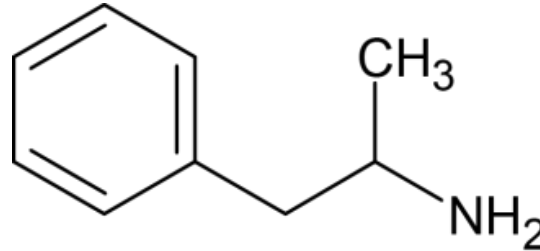


THC (delta 9 THC)

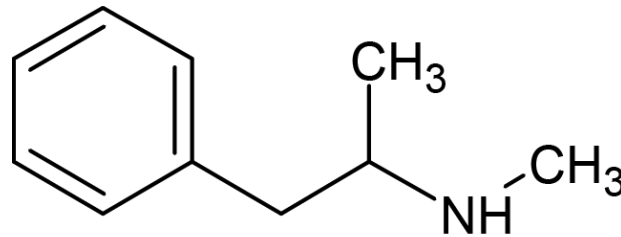


# False Positives/Screen

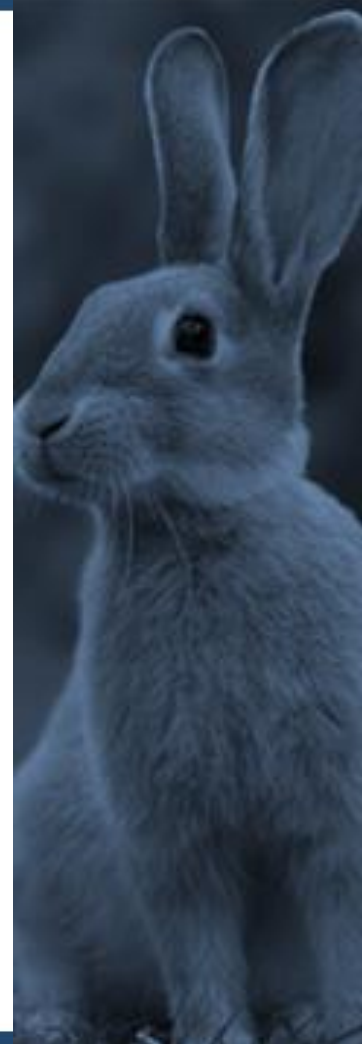
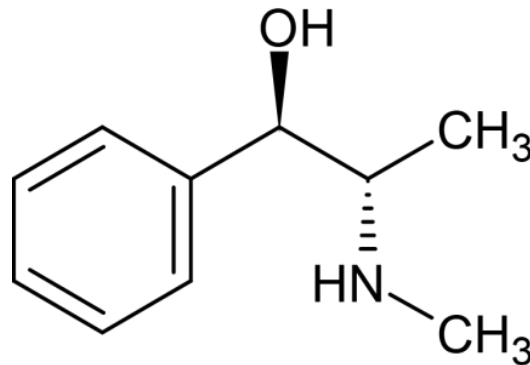
(±)-Amphetamine



(±)-Methamphetamine



Ephedrine

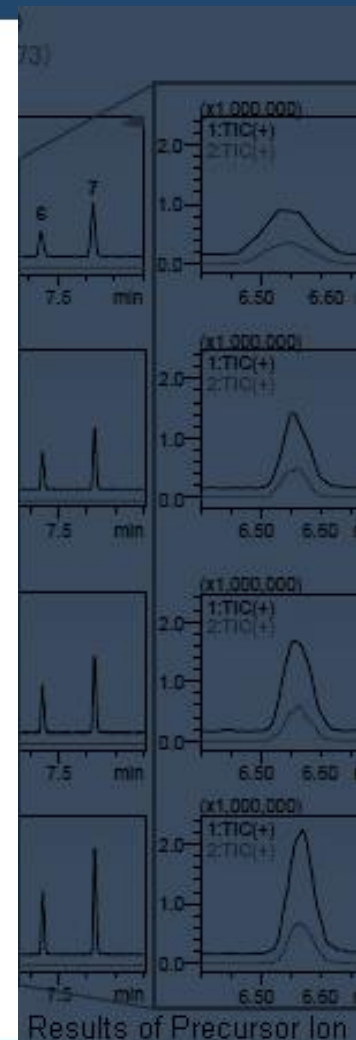


# Confirmation

## What does LCMSMS mean?

Liquid Chromatography, Tandem  
Mass Spectrometry

- It identifies drugs by their “fingerprint”
- Each drug has a unique structure

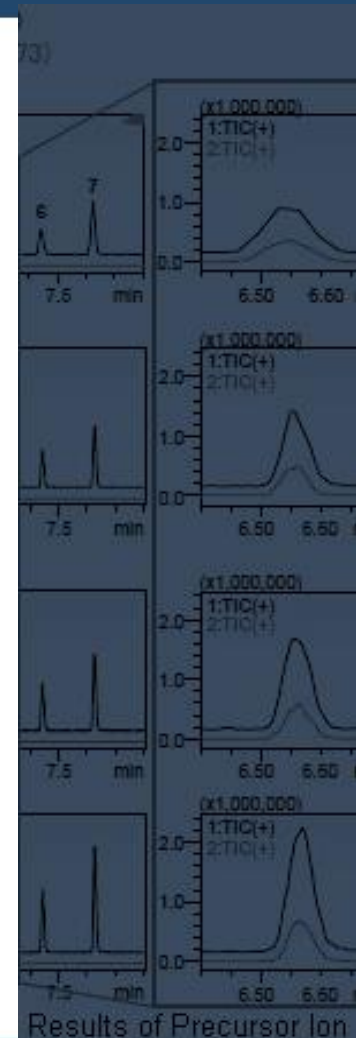


# LC/MS/MS



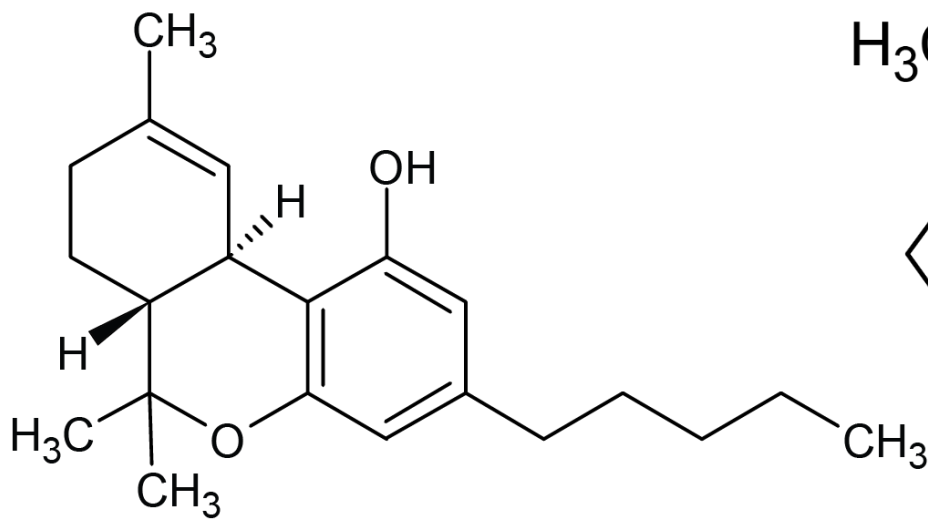
Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS).

LC/MS/MS or “Confirmation testing” is analytically precise and extremely accurate, by measuring the specific molecular mass, and the concentration (amount) of any drug(s), in a sample. The testing identifies not only the parent drug but also its metabolites. Thus providing data on the exact drug and amount of drug found.

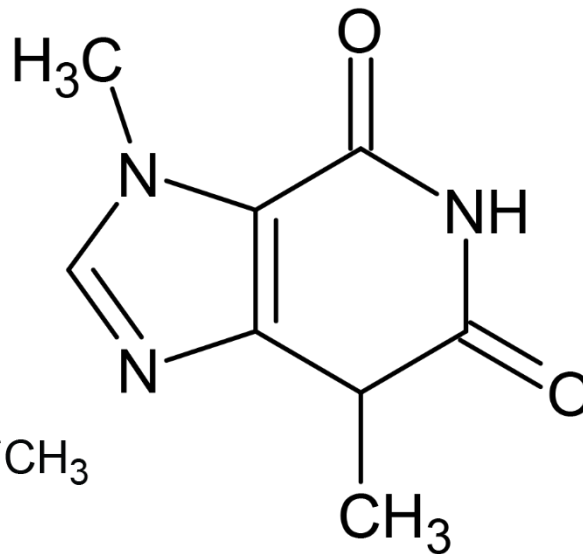


Results of Precursor Ion

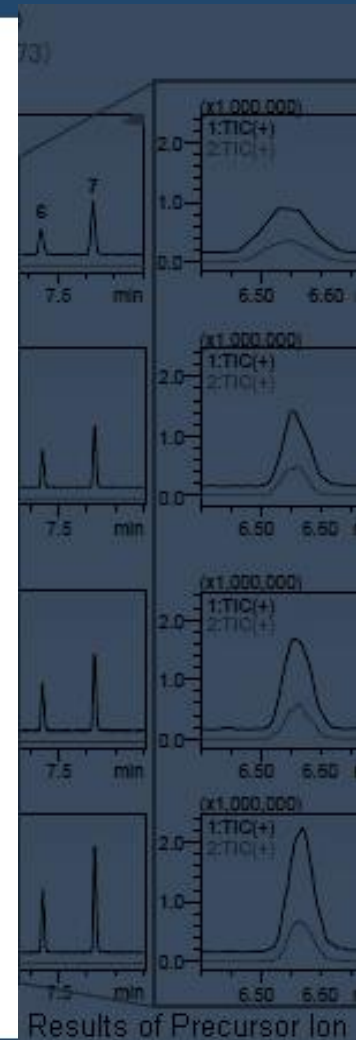
# LC/MS/MS



Marijuana



Chocolate



Results of Precursor Ion





# Oral Fluid Drug List



# Drug List

## Amphetamines

- Amphetamine (Adderall, Vyvanse)
- Adam (MDA)
- Ecstasy (MDMA)
- Methamphetamine
- Methcathinone
- \*Chlorpheniramine
- \*Ephedrine
- \*Phenylpropanolamine
  
- \*Cold pills that screen positive for Meth/Amp

## Cocaine

- Cocaine
- Benzoylcegonine
- Ecgonine methyl ester

## • Marijuana

- Delta 9-THC
- CBD
- CBN

## Date Rape Drugs

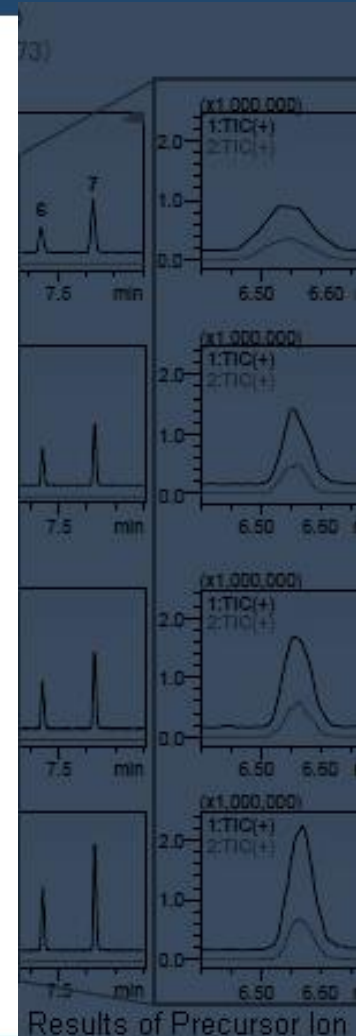
- GHB
- Ketamine

## Nicotine

- Cotinine

## Alcohol Monitoring

- EtG (Ethyl glucuronide)
- Disulfiram (Antabuse)



# Drug List

## Opiates

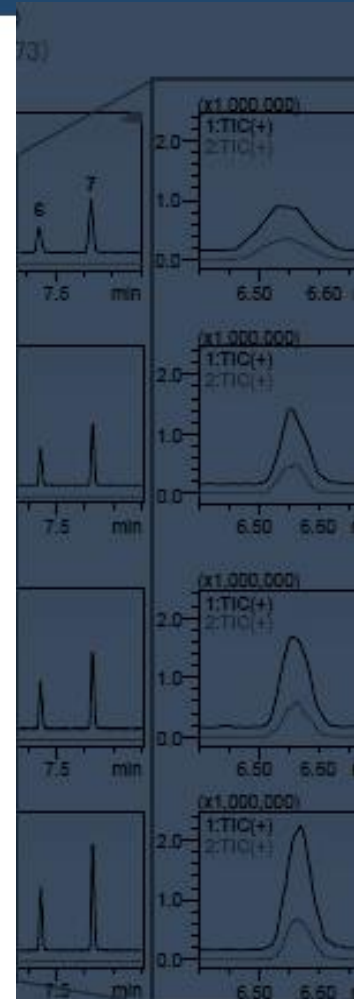
- 6-Acetylmorphine (Heroin)
- Codeine (Tylenol 3)
- Hydrocodone (Vicodin, Lortab, Lorcet,
- Hycodan, Norco, Xodol, Vicoprofen)
- Hydromorphone (Dilaudid)
- Morphine (Kadian, Oramorph, Avinza, MSIR, MS Contin, MSI, MSER)
- Oxycodone (Percocet, Endocet)
- Oxymorphone (Numorphan, Opana)
- Fentanyl
- Pentazocine (Talwin)
- Meperidine (Demerol)
- Propoxyphene (Darvon)
- Dextromethorphan

## Opiate Antagonists

- Naloxone (Narcan)
- Naltrexone (Depade)
- Methadone (Dolophine)
- EDDP
- Buprenorphine (Suboxone, Subose)
- Norbuprenorphine

## Antipsychotics

- Risperidone (Risperdal)
- Quetiapine fumarate (Seroquel)
- Aripiprazole (Abilify)
- Olanzapine (Zyprexa)
- Haloperidol (Haldol)
- Thiothixene (Navane)
- Fluphenazine (Prolixin)
- Ziprasidone (Geodon)



# Drug List

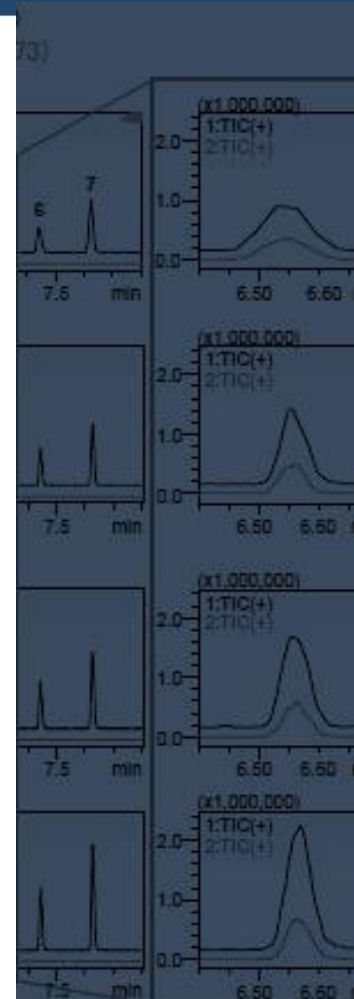
## Therapeutic Drugs

- Topiramate (Topomax) new
- Divalproex sodium/valproic acid (Depakote)
- Gabapentin (Neurontin)
- Carbamazepine (Tegretol)
- Bupropion (Wellbutrin)
- Venlafaxine (Effexor) new
- Mirtazapine (Remeron)
- Trazodone (Desyrel)
- Buspirone (Buspar)
- Propranolol (Inderal)
- Benztropine mesylate (Cogentin)
- Duloxetine (Cymbalta) new
- Zolpidem (Ambien)
- Lamotrigine (Lamictal)
- Tramadol (Ultracet, Ultram)

- Carisoprodol (Soma) Meprobamate
- Methylphenidate (Ritalin, Concerta)
- Clonidine
- Strattera

## Special Request

- **PCP & LSD**
- **Psilocin (Mushrooms)**
- **Methaqualone (Qualudes)**
- **Salvinorin A**
- **Bisacodyl (Dulcolax)**
- **Phentermine (“Phen-Phen”)**
- **Atropine & Scopolamine**
- **Synthetic Fentanyls**
- **Synthetic Marijuana**
- **Bath Salts & NBOME’s**
- **Kratom and Krocodil**



Results of Precursor Ion



# Sample Collection



# Sample Collection | Chain of Custody



		<b>Customer:</b> Forensic Fluids Laboratories <b>Address:</b> _____ <b>Phone:</b> _____ <b>Account#:</b> 13030458 <b>E-mail, Web Portal:</b> _____ <b>Contacts:</b> Bridget Lemberg <a href="mailto:blemberg@forensicfluids.com">blemberg@forensicfluids.com</a>																				
Forensic Fluids Laboratories 225 Parsons Street Kalamazoo, MI, 49007 (866)492-2517 phone (269)492-7704 fax																						
<b>Verification of Donor:</b> <input type="checkbox"/> Photo ID or Court Case #: _____ <input type="checkbox"/> Personally Known <input type="checkbox"/> Other: _____																						
<b>Specimen ID:</b> S0555187																						
<input checked="" type="checkbox"/> Amphetamine <input checked="" type="checkbox"/> Methamphetamine <input checked="" type="checkbox"/> THC <input checked="" type="checkbox"/> Cocaine <input checked="" type="checkbox"/> Opiates <input checked="" type="checkbox"/> Benzodiazepine <input checked="" type="checkbox"/> Barbiturates <input checked="" type="checkbox"/> Methadone <input checked="" type="checkbox"/> PCP <input checked="" type="checkbox"/> Oxycodone																						
<b>Special Requests:</b> _____																						
<b>Donor Information:</b> <input type="checkbox"/> Random <input type="checkbox"/> Suspicion <input type="checkbox"/> Post-Accident <input type="checkbox"/> Pre-Employment <input type="checkbox"/> Treatment <input type="checkbox"/> Probation <b>Donor Name (Print):</b> _____ <b>1 Medications:</b> _____																						
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Date: X																						
<b>Donor Consent:</b> I certify that I voluntarily consent to the collection and testing of my specimen, that the specimen identified on this form is my own, and that it has not been adulterated in any manner. I certify that I provided my specimen to the collector, that the specimen was sealed in my presence, and that the information provided on this form and the label affixed to the specimen is correct. I further authorize the laboratory to release the results of this testing to the client above or to their designee. <b>3</b> Donor Name (Print): _____ X Donor Signature: _____ Date: X _____																						
<b>Observer Certification:</b> I certify that the specimen identified on this form was collected in my presence and presented to me by the donor providing certification above. I certify that I observed the signing and installation of the security seal, and that it has the same identification number as the one indicated on this form. I hereby release this specimen for transportation to the laboratory. <b>4</b> Observer Name (Print): _____ Observer Signature: _____ Date: _____																						

White Copy - Lab      Yellow Copy - Client





# Forensic Fluids Laboratories

Oral Fluid Drug Testing  
225 Parsons Street Kalamazoo, MI, 49007  
(866)492-2517 ph (269)492-7704 fax

**Report To** Example Name  
Example Office  
Address  
City, State Zip

**Report Date** 00/00/0000 00:00  
**Collector** Example Collector  
**Collected** 00/00/0000 00:00

## Oral Fluid

**Specimen ID:** 1234  
**Donor Name/ID:** Example Client/Donor  
**Lab ID:** 1234567  
**Received:** 00/00/0000 00:00

Panels:	Result	Quantitation	Screen Cutoff	Confirm Cutoff
AMPHETAMINE	Negative		20 ng/mL	
METHAMPHETAMINE	Negative		20 ng/mL	
THC	POSITIVE		1 ng/mL	
delta-9 tetrahydrocannabinol	POSITIVE	93.8 ng/mL		0.5 ng/mL
COCAINE	Negative		5 ng/mL	
OPIATES	POSITIVE		10 ng/mL	
6-Acetylmorphine (6MAM)	POSITIVE	51.3 ng/mL		5 ng/mL
Codeine	Negative			10 ng/mL
Hydrocodone	Negative			5 ng/mL
Hydromorphone	POSITIVE	9.6 ng/mL		1 ng/mL
Morphine	POSITIVE	90.6 ng/mL		5 ng/mL
BENZODIAZEPINES	Negative		10 ng/mL	
BARBITURATE	Negative		100 ng/mL	
METHADONE	Negative		5 ng/mL	
PCP	Negative		1 ng/mL	
OXYCODONE	Negative		50 ng/mL	

## Approved By:

X	Bridget Lorenz Lemberg	Lab Director/Toxicologist
	Piyadarsha Amaratunga, PhD	Certifying Scientist, R&D
	Jessica Adamczyk	Certifying Scientist
	Brian Higgins	Certifying Scientist
	John Epstein, MD	MRO

CLIA # 23D1045429  
Confirmed by LC/MS/MS.

FINAL





Questions?

Email [blemberg@forensicfluids.com](mailto:blemberg@forensicfluids.com) for more information

