UTAH FORENSIC TOXICOLOGY LABORATORY

Utah Public Health Laboratories
4431 South 2700 West
Taylorsville, UT 84129
Phone 801. 965. 2400
Fax 801. 965. 2455

WHAT

The Utah Forensic Toxicology Laboratory:

1. Conducts analyses to determine the presence of various substances in biological fluids;
2. Issues written reports of results; and
3. Provides expert witness testimony and serves as a technical resource.

These services are provided to the Office of the Medical Examiner (OME), law enforcement agencies, and other governmental entities involved in criminal matters.

WHY

Toxicology results are used to:

i) Assist the OME in determining cause and manner of death (Utah Code Section 26-4-7);

ii) Provide information in cases involving automobile homicides (Utah Code Section 76-5-207) or suspects driving under the influence (DUI) of alcohol and/or drugs (Utah Code Section 41-6a-502).

WHO

The Utah Forensic Toxicology Laboratory is comprised of:

- 2 Evidence Technicians
- 6 Toxicologists
- 2 Forensic Toxicology Supervisors
- 1 Bureau Director

Evidence Life Cycle in the Laboratory

Evidence Life Cycle Overview

Pre-Analysis

- Delivery
- Accessioning
- Evidence storage

Analysis

- Alcohol
- Drug Screen

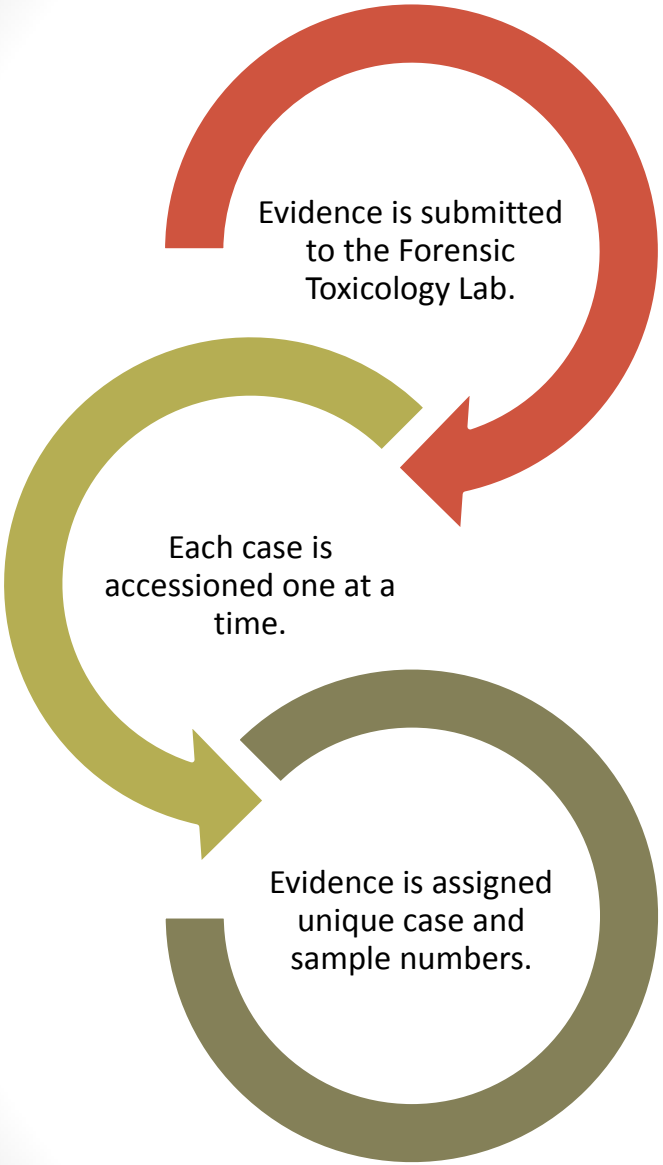
Post-Analysis

- Issuing report
- Evidence return
- Expert testimony

Pre-Analysis

- Delivery
- Accessioning
- Evidence Storage

Delivering Evidence

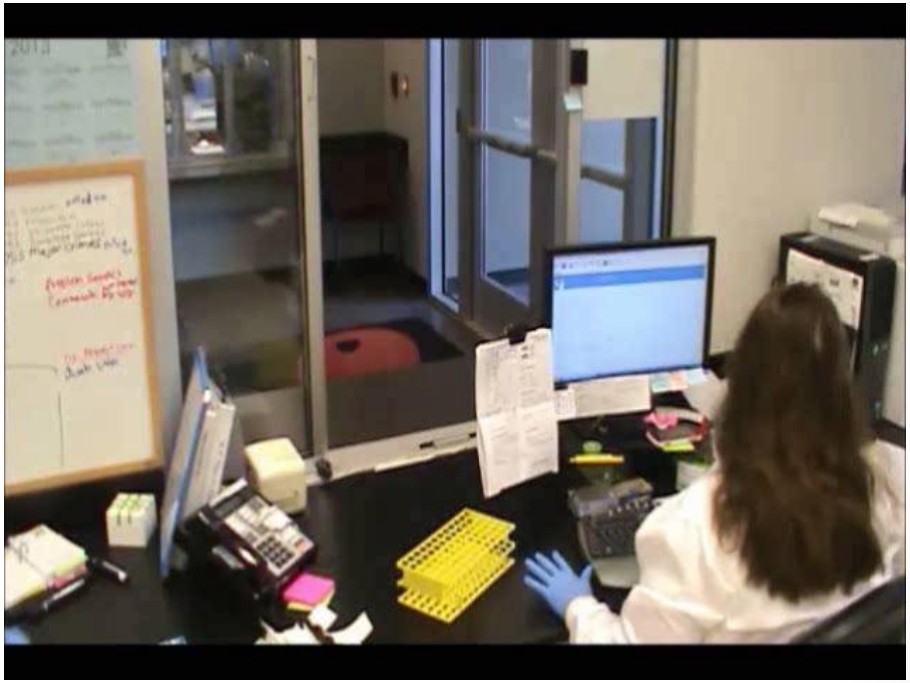


Accessioning

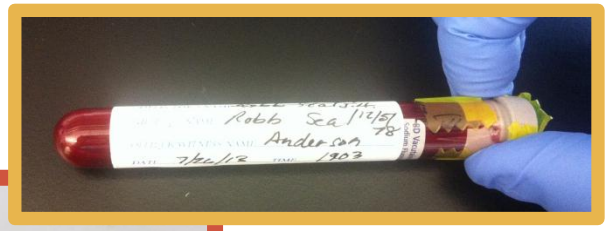
Label information must coincide with request form information

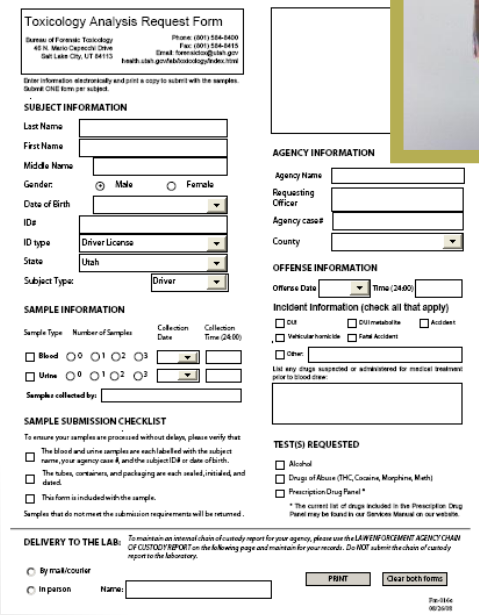
The minimum required label information is Subject Name and Agency Case #.

Evidence is stored in the long-term evidence fridge until they are returned to the agency



Sample Submission Requirements





Toxicology Analysis Request Form

Bureau of Forensic Toxicology
45 N. Mario Capecchi Drive
Salt Lake City, UT 84113

Phone: (801) 584-8400
Fax: (801) 584-8415
Email: hsemsadmin@utah.gov
health.utah.gov/lab/toxicology/index.html

Enter information electronically and print a copy to submit with the samples. Submit ONE form per subject.

SUBJECT INFORMATION

Last Name
First Name
Middle Name
Gender: Male Female
Date of Birth
ID#
ID type: Driver License
State: Utah
Subject Type: Driver

SAMPLE INFORMATION

Sample Type | Number of Samples | Collection Date | Collection Time (24:00)
Blood 0 1 2 3
Urine 0 1 2 3
Samples collected by:

SAMPLE SUBMISSION CHECKLIST

To ensure your samples are processed without delays, please verify that

- The blood and urine samples are each labelled with the subject name, your agency case #, and the subject ID# or date of birth.
- The tubes, containers, and packaging are each sealed, initialed, and dated.
- This form is included with the sample.

Samples that do not meet the submission requirements will be returned.

AGENCY INFORMATION

Agency Name
Requesting Officer
Agency case#
County

OFFENSE INFORMATION

Offense Date | Time (24:00)

Incident information (check all that apply)

- DUI
- DUI metabolite
- Accident
- Vehicular homicide
- Fatal Accident
- Other:

List any drugs suspected or administered for medical treatment prior to blood draw:

TEST(S) REQUESTED

- Alcohol
- Drugs of Abuse (THC, Cocaine, Morphine, Meth)
- Prescription Drug Panel *

* The current list of drugs included in the Prescription Drug Panel may be found in our Services Manual on our website.

DELIVERY TO THE LAB: *To maintain an internal chain of custody report for your agency, please use the LAW ENFORCEMENT AGENCY CHAIN OF CUSTODY REPORT on the following page and maintain for your records. Do NOT submit the chain of custody report to the laboratory.*

By mail/courier
In person Name:

PRINT | Clear both forms

Pre-0166
06/26/08

Submission criteria must be met before testing can begin.

1. All samples must be labelled with:
   - Subject Name
   - Agency Case Number
2. All samples and packaging must be sealed, dated, and initialed.
3. Information on samples must agree with information on Analysis Request form.

Analysis

- Alcohol
- Drug Screen

Toxicology testing panels

Alcohol

- Screen by HS/GC
- Confirmation by HS/GC

Drugs of Abuse (Illicit)

- Screen by immunoassay
- Confirmation by GC/MS

Rx and OTC drugs

- Screen by LC/MS
- Confirmation by GC/MS or LC/MS/MS

Each test is composed of 5 steps:

Aliquot	Sample Preparation	Instrumental analysis	Results reporting	Technical Review
Obtain the sample from the fridge and take a small amount for testing. Return the sample to the fridge.	Each test is composed of a variety of clean-up steps to better isolate the drug(s) of interest. This step takes 2-8 hours depending on the analysis.	Run the samples on the instrument. This step takes 4-12 hours depending on the analysis.	Analyze the data, enter results on the Laboratory Information Management System (LIMS), and submit batch for approval.	Supervisors review each batch to verify acceptance criteria are met. If batch is approved, results get updated on LIMS, and subsequent tests can proceed.

Ethanol testing by HS/GC

(1) Aliquot → (2) Return to Storage → (3) Sample Preparation → (4) Instrumental Analysis → (5) Results reporting

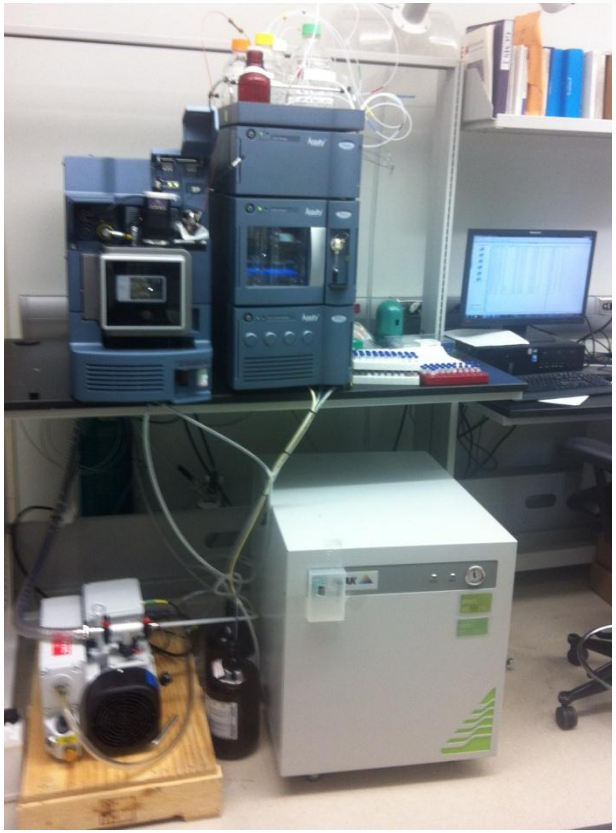
Drug screening by Immunoassay

(1) Aliquot → (2) Return to Storage → (3) Sample Preparation → (4) Instrumental Analysis → (5) Results reporting

Drug screening by LC/MS-TOF

(1) Aliquot → (2) Return to Storage → (3) Sample Preparation → (4) Instrumental Analysis → (5) Results reporting

Drug confirmation by GC/MS or LC/MS/MS

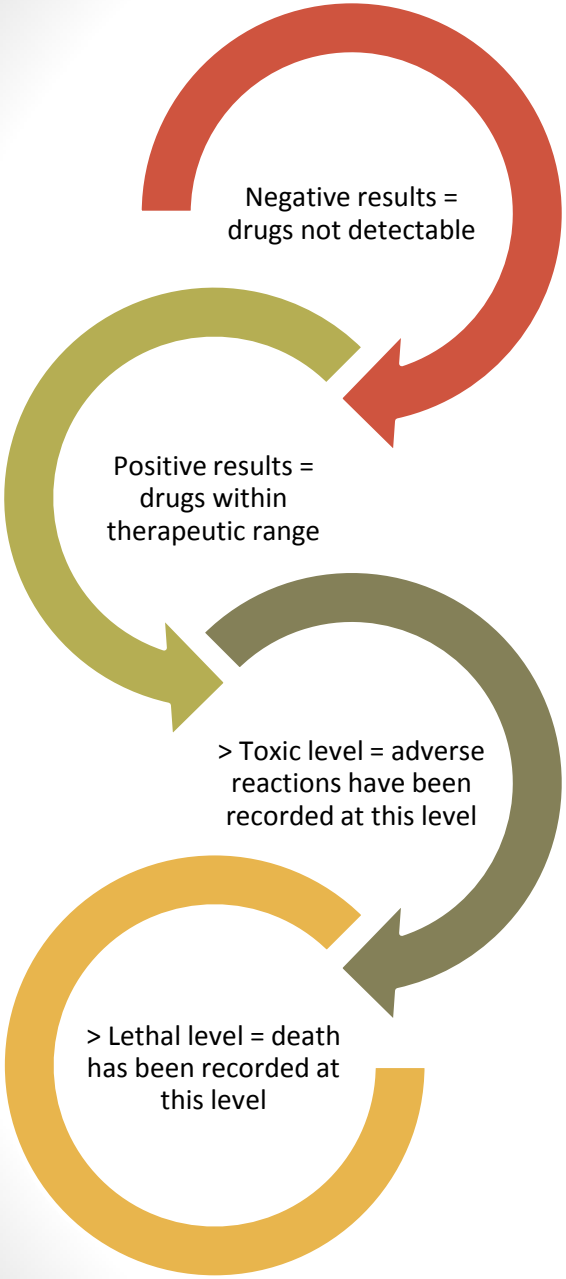


(1) Aliquot → (2) Return to Storage → (3) Sample Preparation → (4) Instrumental Analysis → (5) Results reporting

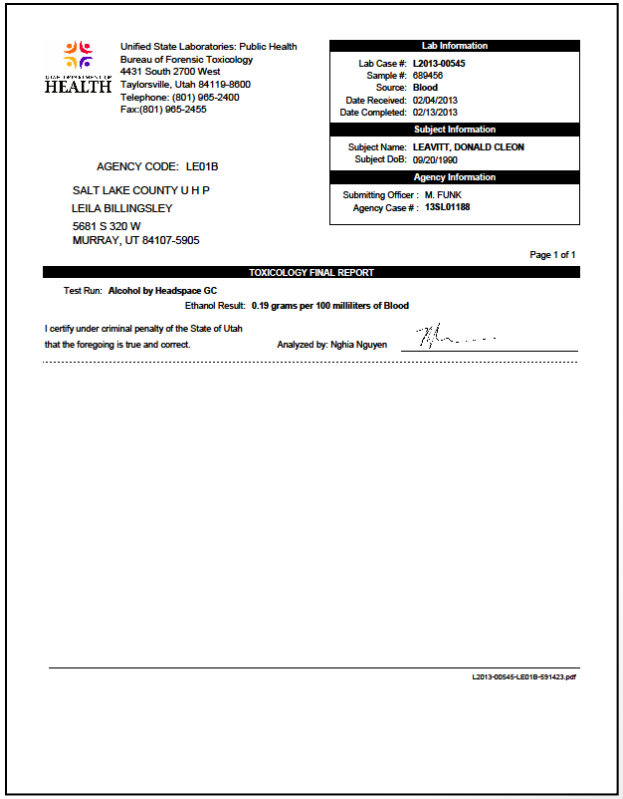
Post-Analysis

- Issuing report
- Evidence Return
- Expert Testimony

The Toxicology report



- Each case is reviewed in its entirety before the report is issued.
- The report is issued to the submitting officer.



UTAH DEPARTMENT OF HEALTH

Unified State Laboratories: Public Health
Bureau of Forensic Toxicology
4431 South 2700 West
Taylorsville, Utah 84119-8600
Telephone: (801) 965-2400
Fax:(801) 965-2455

Lab Information

Lab Case #: **L2013-00545**
Sample #: **689456**
Source: **Blood**
Date Received: 02/04/2013
Date Completed: 02/13/2013

Subject Information

Subject Name: **LEAVITT, DONALD CLEON**
Subject DoB: 09/20/1990

Agency Information

Submitting Officer : M. FUNK
Agency Case # : **13SL01188**

AGENCY CODE: LE01B

SALT LAKE COUNTY U H P
LEILA BILLINGSLEY
5681 S 320 W
MURRAY, UT 84107-5905

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TOXICOLOGY FINAL REPORT

Test Run: **Alcohol by Headspace GC**

Ethanol Result: **0.19 grams per 100 milliliters of Blood**

I certify under criminal penalty of the State of Utah that the foregoing is true and correct.

Analyzed by: Nghia Nguyen

L2013-00545-LE01B-691423.pdf

Evidence return

Evidence returned 8 weeks after report is issued.

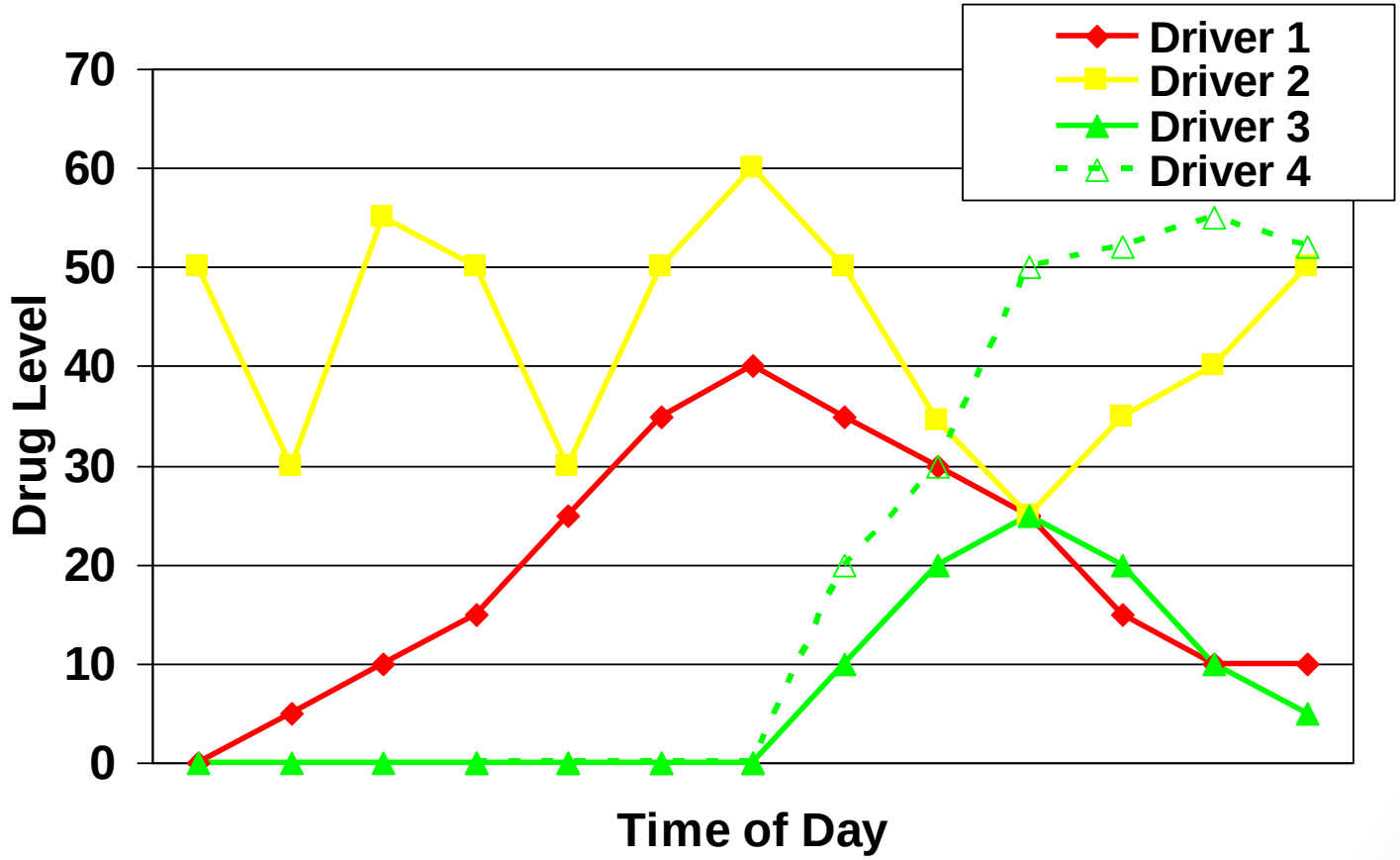
Evidence is returned in original packaging.

Expert Testimony

- For CY 2013, the Forensic Toxicology Lab has been served 537 subpoenas.
  - We have logged 857 hours preparing for cases.
  - We have appeared in 51 of the 857 cases.
  - Of the 51 cases, we testified in 37 cases.
  - Therefore, 93% of case preparation time is wasted.

Frequently Asked Questions

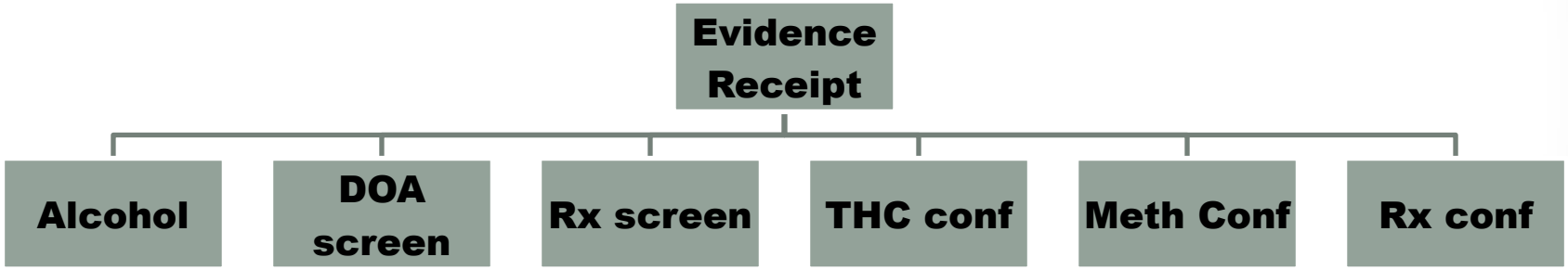
Why don't you report drug levels on all cases?



What about the possibility of contamination?

- Grey top vacuum tubes cannot draw blood if they are compromised.
- Samples that do not meet submission requirements are not tested.

Why are there >1 toxicologists on a case?



Which is a better sample – blood or urine?

- Blood
  - Indicates recent use
  - May corroborate impairment
  - Some drugs easier to detect
- Urine
  - Easier to obtain
  - Drugs detectable longer
  - Some drugs easier to detect

What is the difference between a drug and its metabolite?

DRUG	METABOLITE
Parent compound	Breakdown product of parent compound. May also be a parent compound itself.
Drug designed for specific action on body	May or may not be active in body
May or may not be detectable for long periods of time in blood/urine	May or may not be detectable for long periods of time in blood/urine
May or may not be impairing	May or may not be impairing

How long can drugs be detected?

Drug	Blood (dose dependent)		Urine	
Alcohol	3 - 12	hours		
Amines	1 – 3	days		24 – 72+
hours				
Barbiturates				
Butalbital	48	hours		2- 4
days				
Phenobarbital	5	days		2 - 6
weeks				
Benzodiazepines	Varies (hours to days)			
Cocaine	5	hours		12
hours				
Benzoylecgonine			2- 4	days
Carisoprodal				
Codeine	4- 8	hours		2- 4
days				
GHB	4	hours		8
hours				
Heroin (Morphine)	1- 4	hours		3 - 4
days				
Hydrocodone	4- 8	hours		3- 4
days				
Meprobamate	24	hours		2
days				
Methadone	24	hours		2 – 3
weeks				
THC				
Infrequent User	1 – 4	hours		N/A
Frequent User	3 – 6	hours		N/A
THC-COOH				
Infrequent User	2 – 3+	days		2
weeks				
Frequent User	2+	weeks		3 – 6+
weeks				

How do you calculate blood alcohol?

Injection 1 results	Injection 2 results	Mean	+/-5%
	▪ 0.084		▪ 0.084
	▪ 0.082		
		▪ 0.080	
▪ 0.078			
▪ 0.076			▪ 0.076

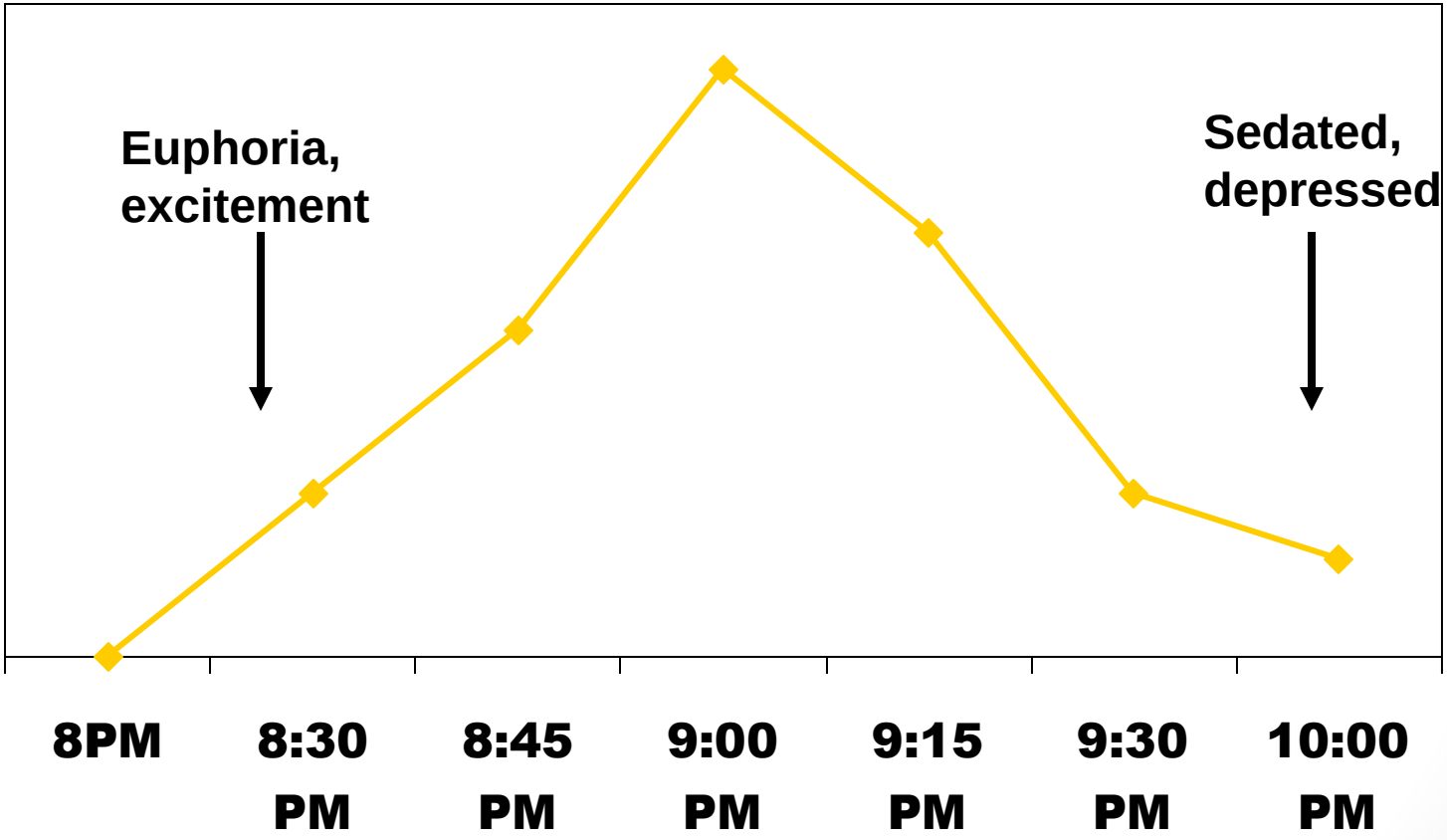
Truncate and report minimum

▪ **0.07**

How accurate are BA results?

- If bullseye = 5%, BA results hit the target 99.5% of the time.
- If bullseye = 7%, BA results hit the target 99.9% of the time.

Why can't the toxicologist do back extrapolations?



What drugs do you test for?

Volatiles panel

1) Ethanol
2) Acetone
3) Isopropanol
4) Methanol

Illicit Drugs (DOA) panel

1. Amphetamine
2. Benzoylecgonine
3. Cocaine
4. Methamphetamine
5. MDA
6. MDMA
7. Heroin
8. Morphine
9. THC
10. Carboxy-THC

Rx/OTC panel

1) 6-monoacetylmorphine
2) 7-Aminoclonazepam
3) Acetaminophen (paracetemol)
4) Alprazolam
5) Amitriptyline
6) Butalbital
7) Carbamazepine
8) Carisoprodol
9) Chlordiazepoxide
10)Chlorpheniramine
11)Citalopram
12)Clonazepam
13)Codeine
14)Cyclobenzaprine
15) Dextromethorphan/Methorphan
16) Dextrorphan/Levorphanol
17) Diazepam
18) Diphenhydramine
19)Doxepin
20)Doxylamine
21)Ephedrine
22) Fentanyl
23)Fluoxetìne
24)Flurazepam
25) Hydrocodone
26) Imipramine
27) Lamotrigine
28) Meperidine
29) Meprobamate
30) Methadone
31) Methy|phenidate
32) Mirtazapine
33) Nordiazepam
34) Norfentanyl
35) Nortripty|ine
36) Olanzapine
37) Oxycodone
38) Phenobarbital
39) Phentermine
40) Phenytoin
41) Promethazine
42) Propoxyphene/Dextropropoxyphene
43) Pseudoephedrine
44) Sertraline
45) Temazepam
46) Tramadol
47) Trazodone
48) Venlafaxine
49)Zolpidem