Alabama's Oral Fluid and DUI/D Program

Curt E. Harper, Ph.D., F-ABFT

Chief Toxicologist

2019 California Impaired Driving Task Force

Alabama Dept. Forensic Sciences

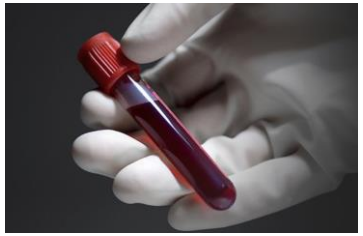
- 15 Toxicologists
- 1 Laboratory (Birmingham)
- 500 cases/mo, 6,000/yr
- DUI & DUI/D (40%)
- Postmortem (60%)
  - 66 County Coroners
  - 3 Medical Examiner Offices

5 years (2013-2017)
6,355 blood tests
81,039 breath tests

DUI – Traffic Stops

DUI – Traffic Crashes

Involving Serious Injury/Deaths



<0.08% (75%)
[77% drug prev.]
>0.08% (25%)
[50% drug prev.]

>0.08%

<0.08%,
Suspected DUI/D

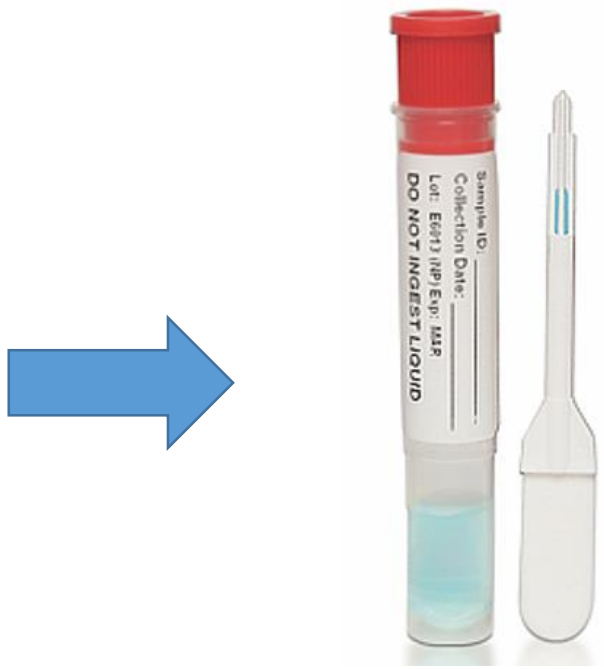
10% of <0.08%
1,135/11,345

<0.08% (14%)
[77% drug prev.]
>0.08% (86%)
[50% drug prev.]

Oral Fluid Drug Testing

Roadside Screen (Probable Cause)

Confirmation (Evidentiary)



1st State to Offer In-house Confirmation

SOFT/AAFS Oral Fluid Ad Hoc Committee

Members

- Christine Moore (Chair)
- Curt Harper (Vice Chair)
- Marilyn Huestis
- Timothy Rohrig
- Jarrad Wagner
- Madeleine Swortwood
- Luke Rodda
- Chares LoDico
- Mandi Mohr
- Kristen Burke
- Nathalie Desrosiers

Documents

- OF FAQ Document 2.0 *(2017)*
  - Advantages
  - Limitations
  - Specimen comparison

  http://soft-tox.org/files/2017_OF_FAQ.pdf

- OF Pilot Project Guidelines
  - Key Stakeholders
  - Program Management
  - Program Protocol
  - Consent Form (example)

  http://soft-tox.org/files/2014_OF_Pilot.pdf

Step#1: Stakeholder's Meetings & Outreach

- Traffic Safety Resource Prosecutor (TSRP)
- DRE Coordinator & Program
- Prosecutor's Training (2016/2017/2018)
- Judge's Symposium (2016/2017)
- Collaboration with Vendors
- Alabama Impaired Driving Prevention Council (AIDPC)
- ADECA

- Step #2: Develop Study Design
  - Roadside screening, laboratory confirmation
  - No legislative change needed. Must modify ADFS Rules.

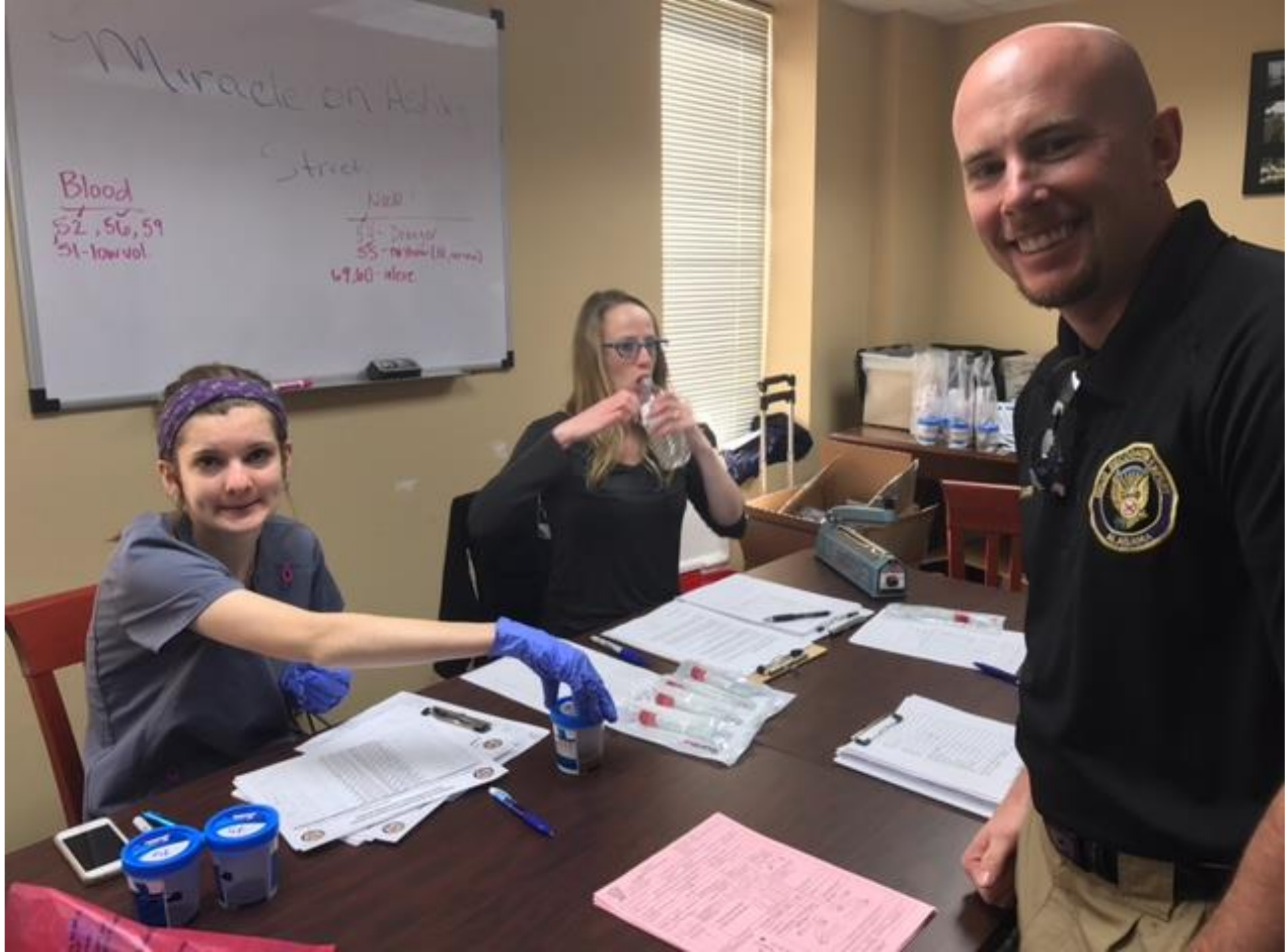
ADFS OF Study Summary

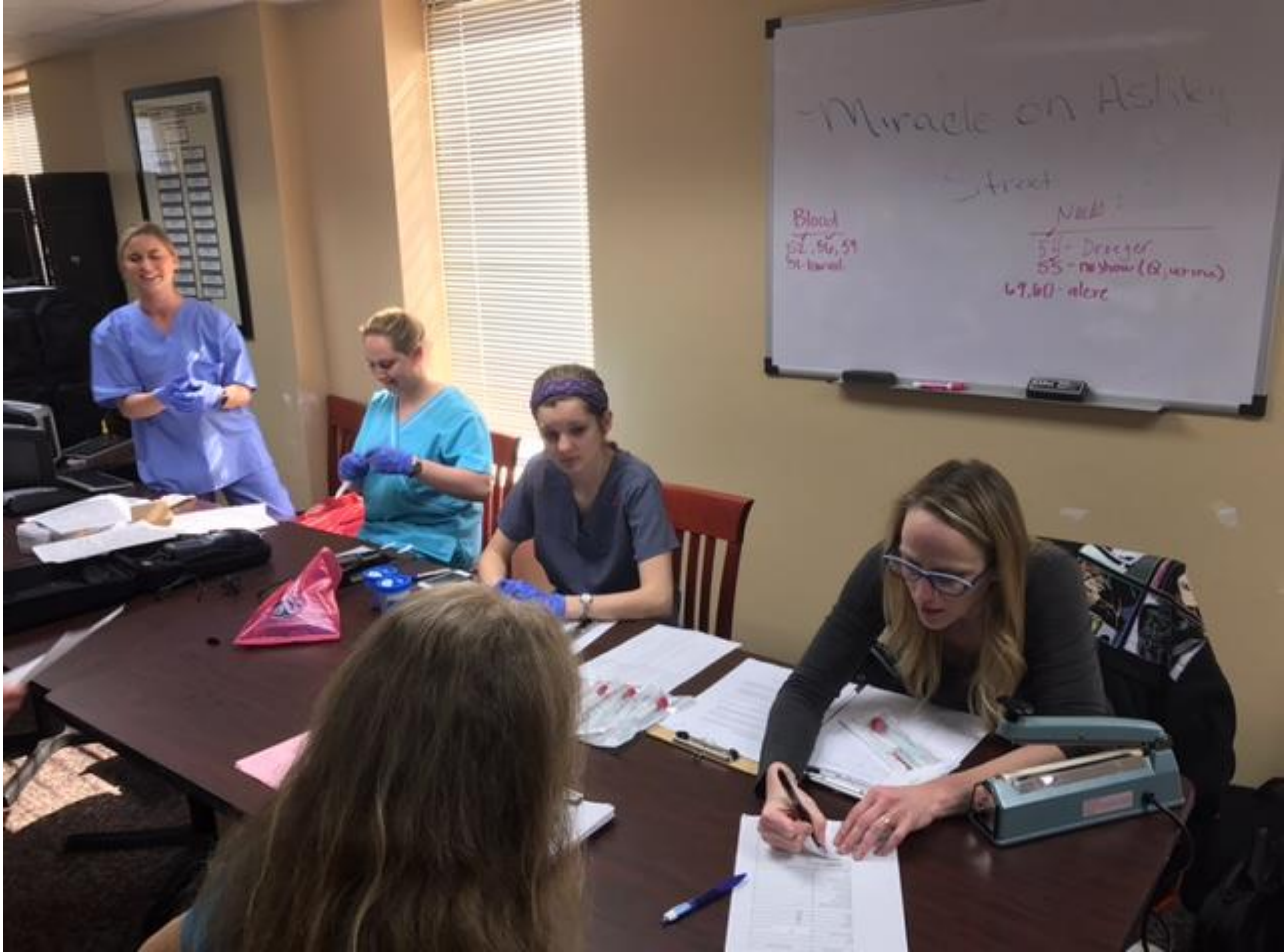
- Alabama Drug Recognition Expert (DRE), TSRP B. Lindsey
- Clara White Mission – Jacksonville, FL
- Proof of principle study set forth to validate the use of :
  - Aim #1: OF screening in the field by officers
  - Aim #2: OF confirmation testing at ADFS
- 3 Oral Fluid Screening Devices
  1. SoToxa (fka Alere DDS2)
  2. Draeger DT5000
  3. Randox Evidence MultiSTAT
- Developed OF confirm methods at ADFS
- AL Code: Blood, Urine, or other bodily substance
  - There was no need to change state statue (huge advantage)
- Modified ADFS Rules and Regulations for Testing
  - In effect June 24, 2018
  - First oral fluid case: Summer 2018

DUID Applications for Oral Fluid Drug Screening Devices

At the Roadside

Roadblocks, Jails, DRE field Certs


Blood
52, 56, 59
51-low vol


Miracle on Ashley
Street
Blood
Next

Specification Comparison

	Alere DDS2	Draeger DT5000	Randox MultiSTAT
Time to complete (min)	5	10	17
Size	Small	Medium	Large
Number of targets	6	7	21

Cutoffs (ng/mL)

Target	Alere SoToxa	Draeger DT5000	Randox MultiSTAT
Cocaine	**30**	**20**	**20**
THC	**25**	**5**	**10**
Opiates	**40**	**20**	**10**
Benzodiazepine	**20**	**15**	**20**
Methamphetamine	**50**	**35**	**50**
Amphetamine	**50**	**50**	**50**
Methadone	**NA**	**20**	**4**

Parameters

- Sensitivity = TP/(TP + FN)
  - Ability to identify positive cases
- Specificity = TN/(TN+FP)
  - Ability to avoid false positives, identify negative cases
- Positive Predictive Value = TP/(TP+FP)
  - Ability to correctly label as positive
- Negative Predictive Value = TN/(TN+FN)
  - Ability to correctly label as negative
- Accuracy = (TP+TN)/(TP+FP+TN+FN)
  - Overall correctness

Summary of Roadside Device Performance

Cocaine, THC, Meth, Opiates, Methadone*

	Alere SoToxa*	Draeger DT5000	Randox Multi-STAT
Specificity	>80	>80	>80
PPV	>80	>80	>80
NPV	>80	>80	>80
Sensitivity	>80	>80	>80
Accuracy	>80	>80	>80

Benzodiazepines

Specificity	98	100	100
PPV	75	100	100
NPV	98	97	100
Sensitivity	75	57	100
Accuracy	96	97	100

SOFT/AAFS Oral Fluid FAQ 2.0:
Should labs develop Qual or Quant OF confirmation

The 3 No-no's

1. Most drugs (e.g. smoked, vaped or snorted):
   OF drug concs do not predict concurrent blood drug concs
2. Not recommended to estimate drug concs in whole blood from OF drug concs or vice versa
3. Not possible to correlate a quantitative drug conc. in OF, blood or urine directly to degree of impairment

For these reasons….

SOFT/AAFS Oral Fluid FAQ 2.0:
Should labs develop Qual or Quant OF confirmation

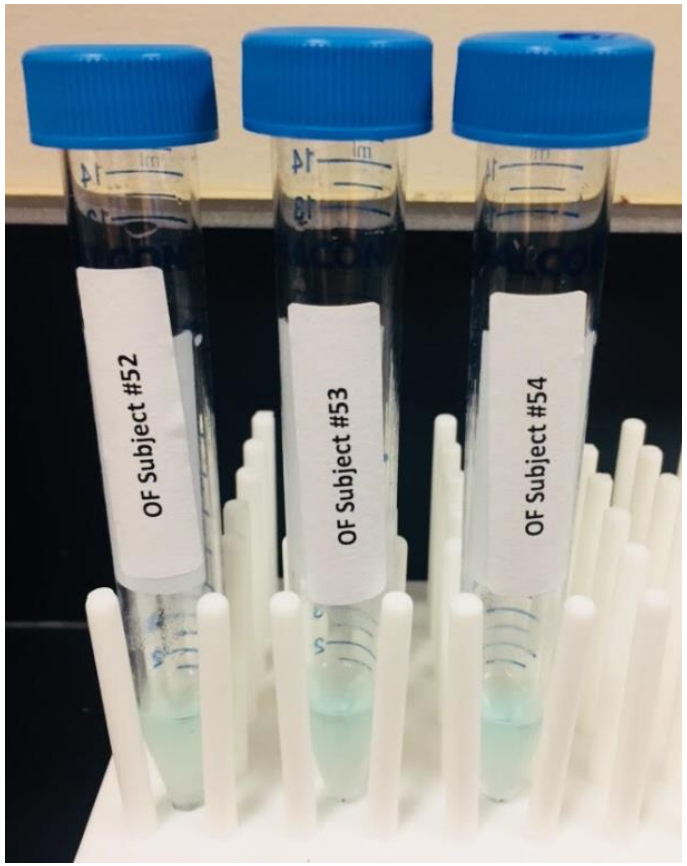
Recommended practice:

- Qualitative (present or ND) methods recommended since there is not a direct correlation b/t concs in OF and blood in most cases due to a variety of factors
  - Oral cavity contamination from recent use, unknown exact volume of confirmation fluid specimen, individual variability in PK and PD
- Quantitative measurement of drug concs for research purpose
  - Developing a better understanding of typical OF drug concs in various populations
  - Helps with the development of screening devices with the appropriate sensitivity

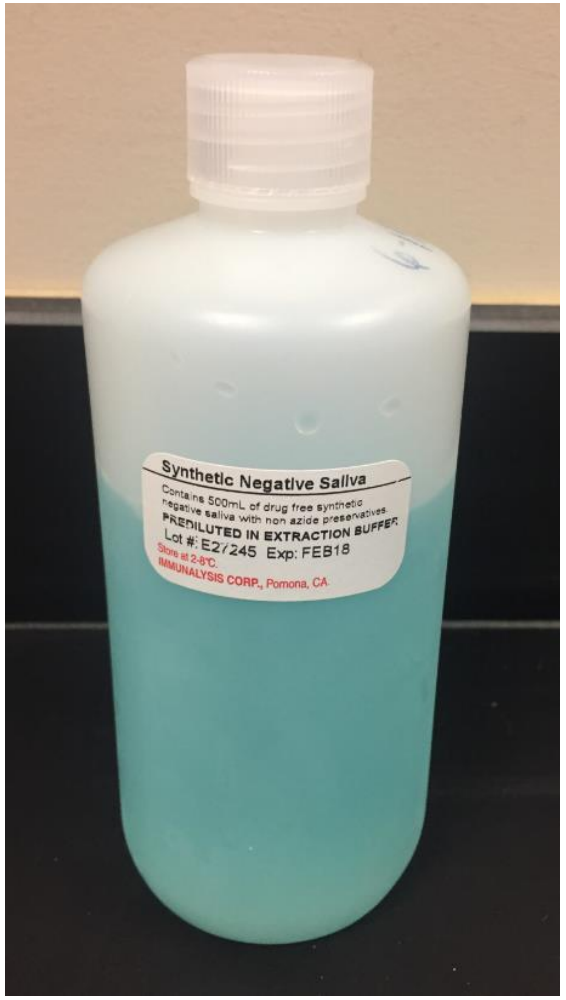
Quantisal™ Oral Fluid Confirmation

3 mL buffer & 1 mL (+/- 10%) sample

Plungers

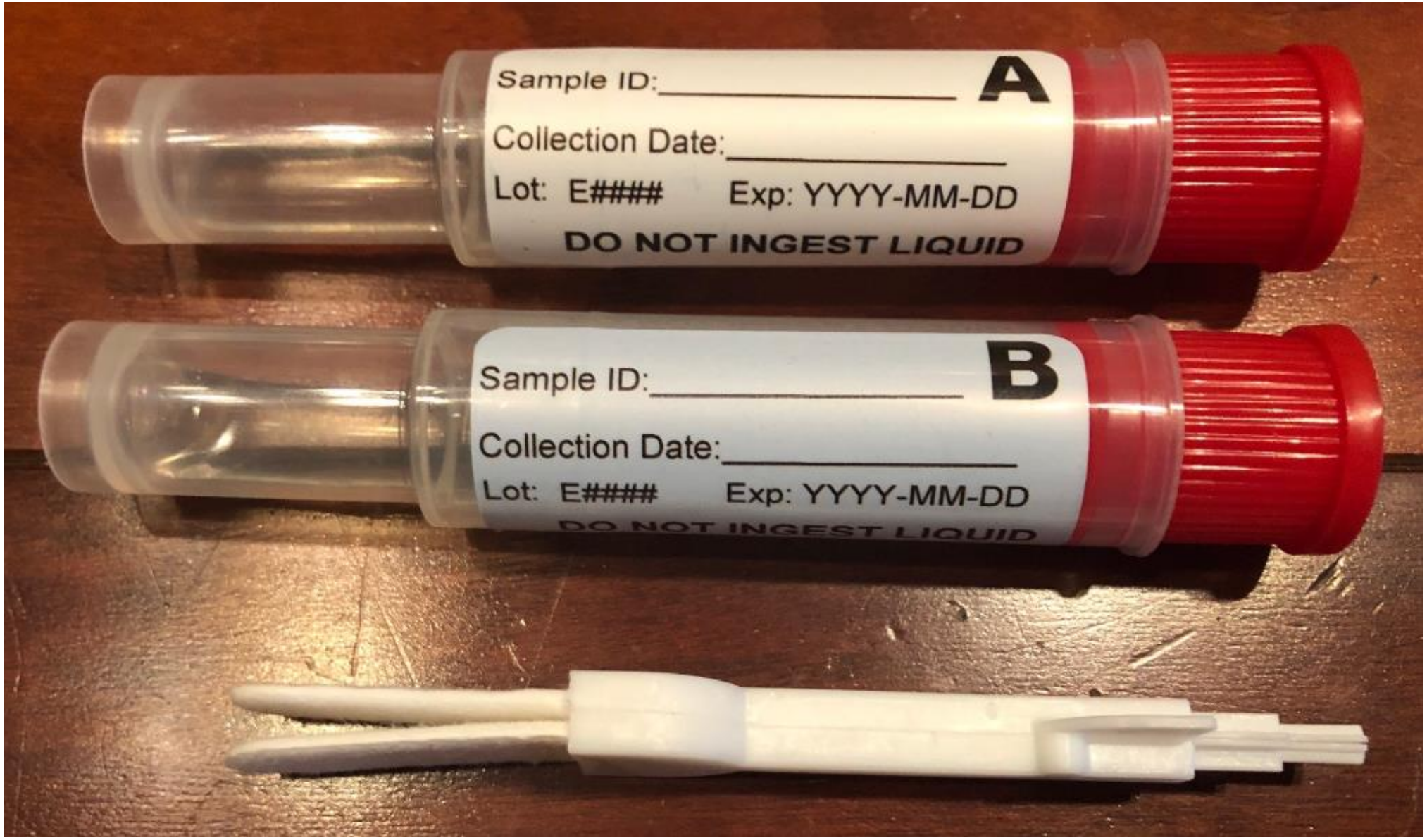


Transferred to screw cap tubes



Synthetic Negative OF

Quantisal 2.0™ Oral Fluid Confirmation



Agilent 6460/6430 QQQ LC/MS/MS: Confirmation

2 Confirmation Methods at ADFS:

1. (19) Drugs of Abuse
2. (6) Cannabinoids

(25 Total Targets)

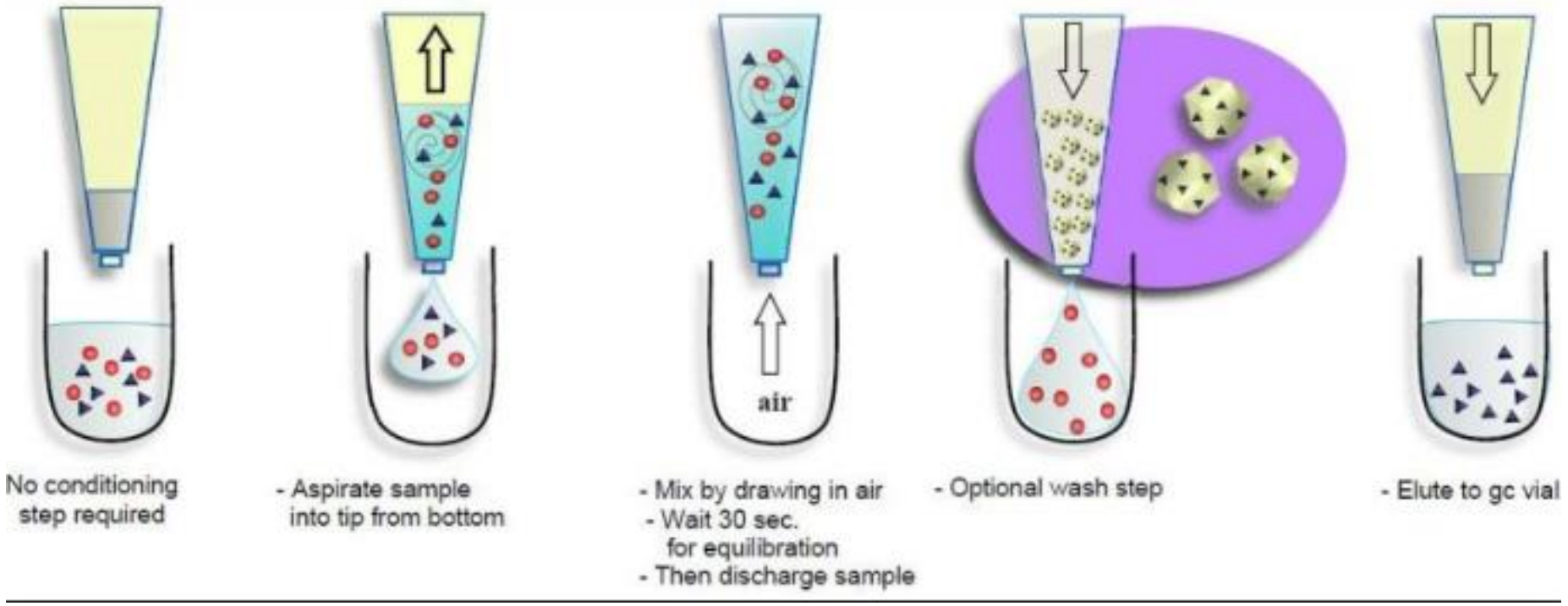
95% of DUID Targets

**Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities.* JAT 2017.

ADFS 19 Target Method: DPX® Technology

MeOH

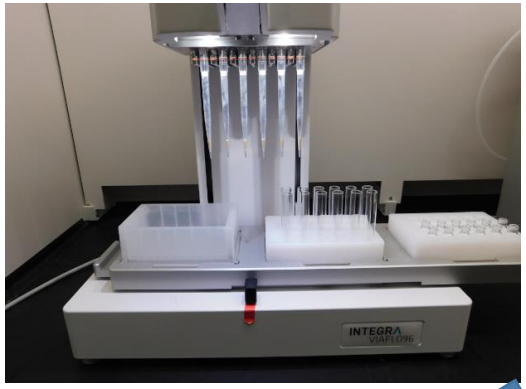
ACN with 1% formic acid



Mobile Phases

MPA- 0.1% formic acid in water
MPB- 0.1% formic acid in ACN
Gradient – 98:2 (0-8 min, 50:50 (8-9 min), 2:98 (9-12 min)l
Agilent Poroshell 120 EC-C18 (2.8 um, 2.1 x`100 mm)
5 µL injection, Wash = IPA/MeOH/Water (33:33:33)

Full Automation: The Wave of the Future



Integra

Hamilton Starlet

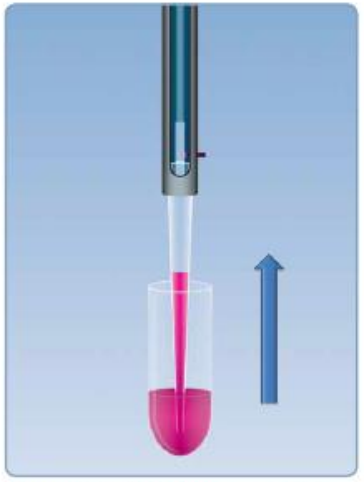


Figure 1: Aspiration from a sample tube

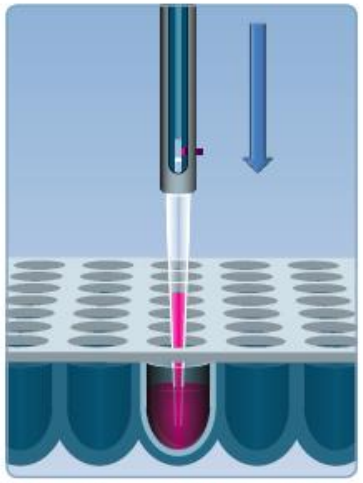
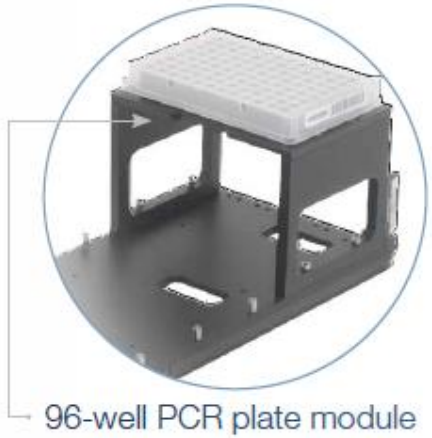
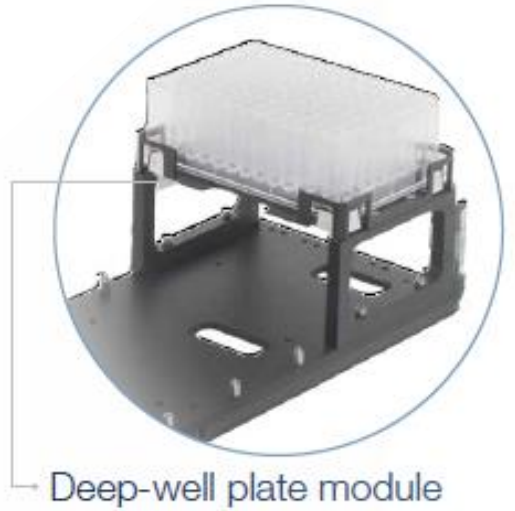


Figure 2: Dispense into a 96-well plate



96-well PCR plate module



Deep-well plate module

	19 Targets: DPX Extraction OF	*NSC LOD (ng/mL)	Integra LOD (ng/mL)	Integra (Admin) LOD (ng/mL)	Hamilton Starlet LOD (ng/mL)
1	Amphetamine	20	1.0	20	20
2	Methamphetamine	20	1.0	20	20
3	Carisoprodol	100	1.0	100	100
4	Meprobamate	100	1.0	100	100
5	Diazepam	1.0	1.0	1.0	1.0
6	Nordiazepam	1.0	4.0*	4.0	4.0
7	Alprazolam	1.0	4.0*	4.0	4.0
8	Clonazepam	1.0	4.0*	4.0	4.0
9	Lorazepam	1.0	4.0*	4.0	10^
10	Cocaine	8	1.0	10	10
11	BE	8	1.0	10	10
12	Morphine	5	1.0	5	5
13	Hydrocodone	5	1.0	5	5
14	Oxycodone	5	1.0	5	5
15	Methadone	10	1.0	10	10
16	Zolpidem	10	1.0	10	10
17	6-MAM	2	0.5	0.5	0.5
18	Fentanyl	0.5	1.0	1.0	1.0
19	Buprenorphine	0.5	2.0	2.0	4.0^

ADFS Cannabinoids LLE Method

Procedure

1. Spike controls in 1 mL of oral fluid/buffer solution.
2. Add 50 µL of IS Mix (0.1 µg/mL) to 500 µL of prepared sample.
3. Add 200 µL of 5% formic acid in water.
4. Vortex.
5. Add 3 mL of 80:10:10 n-hexane/diethyl ether/ ethyl acetate
6. Rotate for 5 min.
7. Centrifuge for 10 min.
8. Transfer upper layer to a conical tube.
9. Dry down @ 45 C°
10. Reconstitute with 100 µL of 50: 50 MPA/MPB

Mobile Phases

- MPA- 5 mM Ammonium formate with 0.1% formic acid in water
- MPB- 0.1% formic acid in methanol
- Gradient – 50:50 (0-5 min), 35:65 (5-8 min), 5-95 (8-10 min)
- Agilent Poroshell 120 EC-C18 (2.8 um, 2.1 x`100 mm)

ADFS Cannabinoids LLE Method

Target	*NSC Recommended LOD (ng/mL)	LOD (ng/mL)	LOQs (as of March 2019)
THC	2	0.5	1.0
THC-OH	N/A	4.0	4.0
THC-COOH	N/A	1.0	4.0
Cannabinol	N/A	0.2	4.0
Cannabidiol	N/A	0.5	0.5
Cannabigerol	N/A	0.2	4.0

**Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities.* JAT 2017.

The list of field sobriety alcohol screening devices approved for use in Alabama can be found by following the link on the Department's web page at www.adfs.alabama.gov.

Author: Dale A. Carpenter, Mark A. Pevey, Curt E. Harper, and Gregory L. Turner
Statutory Authority: §32-6-49.13 Code of Alabama, 1975 as amended.
History: Amended: Filed May 19, 2003; adopted July 7, 2003; effective August 11, 2003. Amended: Filed May 10th, 2018; effective June 24th, 2018.

370-1-1-.06 Field Sobriety Drug Screening Devices

(1) Purpose.

This rule list the approved "FIELD BREATHALYZER or OTHER APPROVED DEVICE" as referred to by §32-6-49.13 Code of Alabama, 1975 as amended. Additionally, this rule describes training requirements and minimal operational criteria necessary for accurate and reliable results from oral fluid drug screening devices.

(2) Definitions and Abbreviations:

(a) *Drug*. Any substance, when taken into the human body, which can impair the ability of a person to operate a vehicle safely.

(b) *Negative Result*. A negative result indicate the samples is drug-free for the tested targets or below the cutoff level of the test.

(c) *Observation*. For the purpose of this rule, use of the term observation shall mean to watch. Prior to the administration of a field sobriety screening test employing an approved field sobriety drug screening device a subject must be under the observation of the operator of the device or other law enforcement officer for a period of not less than ten minutes.

(d) *Oral Fluid*. A clear, tasteless fluid comprised of saliva produced by multiple salivary glands, and other constituents inside the mouth.

(e) *Positive Result*. A positive result indicates presence of the drug, its metabolites, or cross-reacting substance but does not indicate level of intoxication, administration route or concentration in the oral fluid. A positive test result should be confirmed by a second test method such as GC/MS (gas chromatography-mass spectrometry) or LC/MS (liquid chromatography-mass spectrometry).

CHEMICAL TEST FOR INTOXICATION CHAPTER 370-1-1

(3) Approved Training. Training afforded by the manufacturer of an approved device and/or training received from the Alabama Department of Forensic Sciences shall constitute approved training.

(4) Operation of Devices.

(a) Officers shall use the device according to the manufacturer's operational procedure.

(b) Every subject must be under observation by an officer for a period of ten minutes before the screening device test is administered.

(c) The subject should not eat, drink, or smoke ten minutes prior to giving a sample.

(5) Quality Control Tests and Maintenance.

(a) Quality control (QC) tests and annual maintenance shall be conducted per manufacturer's operational procedure.

(b) The device is working properly if the QC test(s) pass.

(c) QC test(s) should be conducted at the time of testing or within 24 hours of the subject test.

(6) Training and Maintenance Records. It shall be the responsibility of each law enforcement agency to maintain permanent records documenting the training of each officer in the use of approved field sobriety screening devices and the annual maintenance results on each device in use by the law enforcement agency.

(7) Approved Field Sobriety Drug Screening Device List.

NOTE: For the purpose of this rule, variations or enhancements that do not have any bearing on the drug detecting capability of the instrument, such as the addition of a modem, external printer or passive sampling systems are approved.

The list of field sobriety drug screening devices approved for use in Alabama can be found by following the link on the Department's web page at www.adfs.alabama.gov.

Author: Curt E. Harper
Statutory Authority: §32-6-49.13 Code of Alabama, 1975 as amended.
History: Filed May 10th, 2018; effective June 24th, 2018.

Form DFS-67

ALABAMA DEPARTMENT OF FORENSIC SCIENCES

TOXICOLOGY SPECIMEN COLLECTION – ANTEMORTEM (Living Subjects)

Hoover/Birmingham Regional Laboratory
2026 Valleydale Road, Hoover, AL 35244
Tel (205)-982-9292 Fax (205) 403-2025
https://adfs.alabama.gov/

NOTE

The following are recommendations for collecting and submitting specimens for Toxicological Analyses. This kit is intended for the collection of specimens from **LIVING SUBJECTS**. It is considered best practice to collect both blood and oral fluid. They complement each other and will provide a more complete picture of recent drug use. Blood collection should be witnessed by the investigating officer or by his/her representative who can authenticate the specimens. Oral fluid should be collected by the investigating officer or by his/her representative as close to the arrest or crash as possible (e.g. at roadside).

ORAL FLUID SPECIMEN COLLECTION

1. Collect the Quantisal oral fluid sample in this order of preference:
   a. At Roadside (after 10 minute observation period)
   b. Prior to DRE evaluation (if applicable)
   c. After DRE evaluation (if applicable)
   d. At the same time as the blood draw
2. Check expiration date on Quantisal packaging and ensure subject has refrained from smoking and consumption of food or beverage for 10 minutes prior to specimen collection.
3. Fill out Specimen Security Seal or label with subject's name, date & time of collection, and collector's initials.
4. Peel back and open package to remove collector. Have subject move tongue side to side to accumulate oral fluid in his/her mouth before starting to speed up the collection. Keep the tip of the device pointed down.
5. Instruct subject to position collector (oral absorbent swab) under tongue and close mouth. Keep head down to allow gravity to help with oral fluid collection. Wait until indicator turns BLUE or 10 minutes has elapsed. Note on submission form if indicator turned blue. Collection time may take from 2-10 minutes to collect approximately 1 mL of oral fluid.
6. Hold red-capped tube with blue liquid in an upright position and uncap by pushing up with thumb(s). Instruct subject to insert collector (oral absorbent swab) into the uncapped transport tube and replace the cap.
7. Snap cap firmly into tube for transport.
8. Mix saturated collector (oral absorbent pad) with the blue liquid by gently shaking tube.
9. Seal top of collector with evidence tape or specimen security seal. Initial and date seal.

Do's:

a) Ensure deprivation period of 10 minutes before oral fluid collection.
b) It is recommended to use gloves during sample collection for hygienic purposes.
c) Collect both oral fluid and blood (seek warrant if necessary).
d) Ship samples to laboratory as soon as possible.
e) Store unused collectors at room temperature. Avoid prolonged exposure to heat/sunlight.

Don'ts:

a) Ensure subject does not chew or suck on pad, talk, or remove collector from mouth.
b) Do not stand tube on table. Do not spill or empty liquid from tube.
c) Do not consume buffer in the tube or place collector into mouth after it has been in buffer.
d) Collector and subject should not touch the absorbent pad with fingers or environment.

Video Training: https://immunalysis.com/products/oral-fluid/quantisal/collector-training/

1 Year Status Update

- OF/Blood cases received = 63
- # of OF only = (~10%)
- # of Roadside Devices in the field = ~6-8 devices
- # of Roadside Tests = 33%
- # Kits distributed to LEAs = ~300
- 4 Subpoenas, No Testimony
- Officer Feedback
  - Dry mouth … Doesn't Turn Blue!
  - Consent
  - Cost of Roadside Cartridges, devices

An Increase in THC Concentrations Over the Years in Alabama

Year	Number of Cases (DUIs)	Average THC Concentration (ng/mL)	Number of Cases (Traffic Fatalities)	Average THC Concentration (ng/mL)
2010	98	4.1	53	8.2
2011	77	3.9	32	8.3
2012	53	3.8	26	7.1
2013	40	3.8	37	6.5
2014	88	4.0	43	7.0
2015	166	4.20	39	13
2016	246	4.8	67	10
2017	233	4.6	88	9.3
2018	208	6.8	66	7.8
2019*	275	5.2	57	7.1

OF THC Concentrations

- Lee 2012
  - THC after use = 68 – 10,284 ng/mL
  - THC at 6 hrs = 1.3-11.9 ng/mL
  - Carboxy-THC = 0.02 – 0.76 ng/mL !!!
- Hartman 2015
  - After 15 minutes: Blood (33-68 ng/mL), OF (764-952 ng/mL)
  - After 2 hours: Blood (2-3 ng/mL), OF (33-91 ng/mL)
  - OF THC > 1600 ng/mL indicated within last 1.4 hours
  - OF THC > 600 ng/mL indicated within last 2.3 hours
- Lee 2011
  - Detection Window = 48 hours for 2 ng/mL
  - CBD, CBN, (CBG) useful markers for recent use
- Oral Cavity Contribution, XXX Contamination (Marker of recent use)

Cannabinoid Concentrations in Blood vs Oral Fluid

Target: THC		
	Blood Concentration	OF Concentration
Mean	7.0	113
Median	5.6	37
Max	21.0	943
Min	1.0	0.7
(+) Rate	14/20 = 70%	22/24 = 92%

Target: Carboxy THC		
	Blood Concentration	OF Concentration
Mean	80	ND
Median	37	ND
Max	400	ND
Min	6.2	ND
(+) Rate	16/20 = 80%	0/24 = 0%

Target: Hydroxy THC		
	Blood Concentration	OF Concentration
Mean	4.4	ND
Median	3.9	ND
Max	11	ND
Min	1.0	ND
(+) Rate	14/20 = 70%	0/24 = 0%

Target: Cannabinol		
	Blood Concentration	OF Concentration
Mean	1.0	7.1
Median	1.0	2.6
Max	1.1	25
Min	0.9	1.0
(+) Rate	2/20 = 10%	14/24 = 58%

Target: Cannabigerol		
	Blood Concentration	OF Concentration
Mean	5.5	5.5
Median	1.6	1.6
Max	2.1	24
Min	0.6	0.8
(+) Rate	6/20 = 30%	13/24 = 54%

Target: Cannabidiol		
	Blood Concentration	OF Concentration
Mean	1.8	3.7
Median	1.8	3.7
Max	2.3	3.7
Min	1.3	3.7
(+) Rate	2/20 = 10%	1/24 = 4%

Methamphetamine & Amphetamine Concentrations in Blood vs Oral Fluid

Target: Methamphetamine		
	Blood Concentration	OF Concentration
Mean	555	1397
Median	385	650
Max	2,200	4,800
Min	34	12
(+) Rate	13/16 = 81%	14/15 = 93%

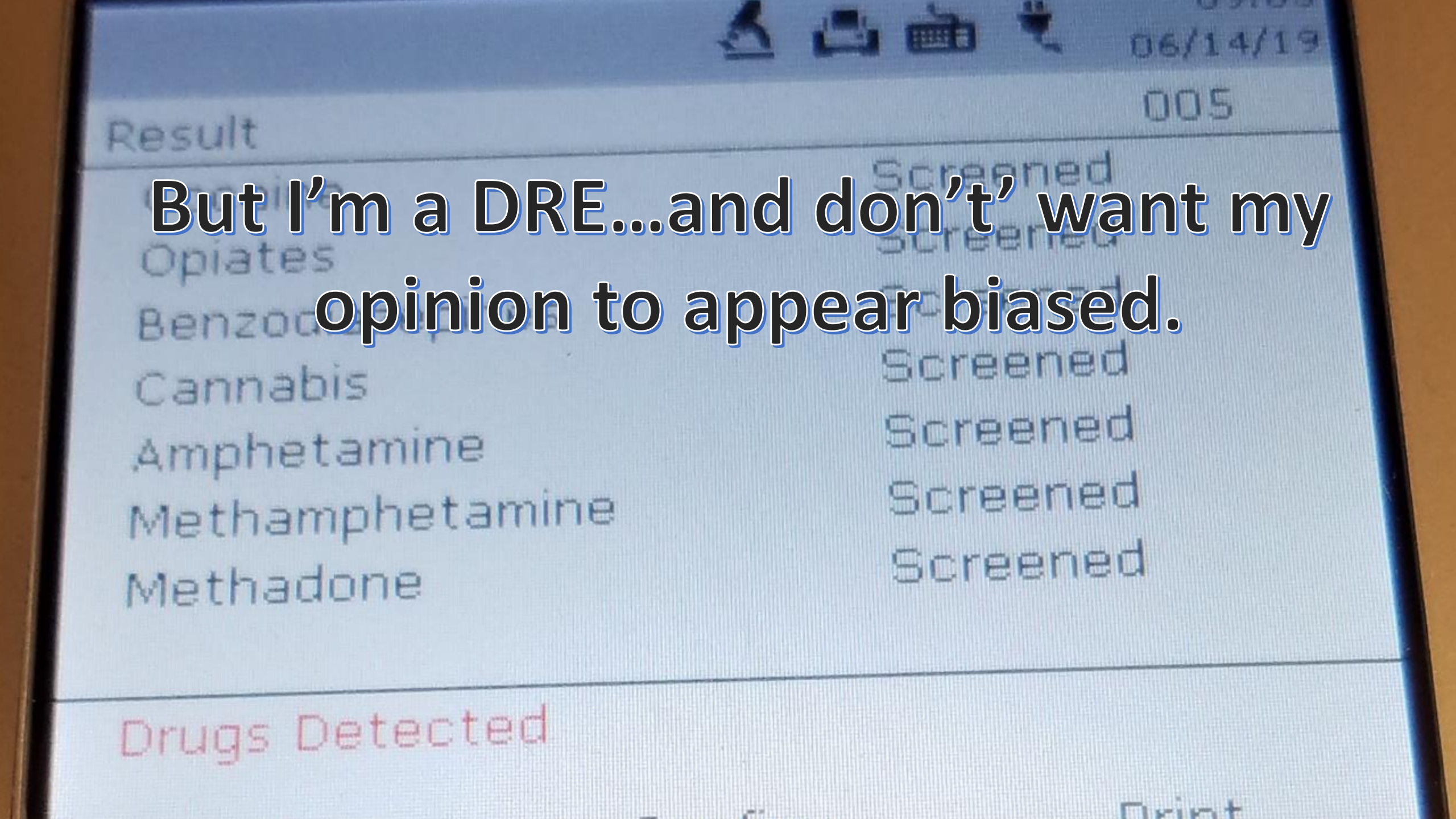
Target: Amphetamine		
	Blood Concentration	OF Concentration
Mean	60	336
Median	51	130
Max	210	920
Min	13	12
(+) Rate	13/16 = 81%	14/15 = 93%

Alprazolam Concentrations in Blood vs Oral Fluid

Target: Alprazolam		
	Blood Concentration	**OF Concentration**
Mean	**96**	**20**
Median	**79**	**13**
Max	**190**	**44**
Min	**<10**	**1.2**
(+) Rate	**5/6 = 83%**	**8/8 =100%**

Anticipated Challenges to OF Drug Testing

- OF conc. correlated to blood conc. and/or impairment?
- Appropriate window of detection?
- Environmental contamination?
- Passive exposure to THC = +OF?
- CBD ingestion = +OF THC?
- Roadside OF screen creates bias to DRE Evaluation?



But I'm a DRE…and don't' want my opinion to appear biased.

Case Studies

Curt E. Harper, Ph.D., F-ABFT

Toxicology Discipline Chief

Case Study #1 Crystal Meth Wreck

- White, Male, 38 year old
- Fiancé died 4 mo. ago, no one with Narcan to “watch after him”
- Admitted drug use:
  - 10 AM (“half a bag” of meth mixed with “little bit” of heroin)
- Time of Crash: 2:10 PM
- DRE Evaluation/OF Sample: 4:10 PM (~2 hours post-crash)
- Time of Blood Draw: 5:04 PM (~3 hours post-crash)
- DRE Evaluation: Narcotic Analgesic, CNS Stimulant

fiancé died 4 months ago

ALABAMA DRUG INFLUENCE EVALUATION

Evaluator: King	DRE #: 29742	Rolling Log #: 18-17-017	Evaluator's Agency: Hoover	Case #: [redacted]
Recorder/Witness: [redacted]	Crash: ☐ None ☐ Fatal ☐ Injury ☒ Property		Arresting Officer's Agency: Hoover PD	
Arrestee's Name (Last, First, Middle): [redacted]	Date of Birth: 1/9/80	Sex: M / Race: W	Arresting Officer (Name, ID#): [redacted]	
Date Examined / Time / Location: 8/10/18 1610 / Hoover	Breath Test: Results: .000	Test Refused Instrument #: ARMY-0506	Chemical Test: ☒ Urine ☒ Blood ☒ Oral Fluid ☐ Test or tests refused	

Miranda Warning Given: ☒ Yes ☐ No — Given by: King

What have you eaten today? Turkey Sandwich — When? 1030

What have you been drinking? Dr Pepper/Water — How much? 16oz — Time of last drink? 1030

Time now/ Actual: 1600-1800 1608 — When did you last sleep? Last night — How long? 3 hrs

Are you sick or injured? ☐ Yes ☒ No

Are you diabetic or epileptic? ☐ Yes ☒ No

Do you take insulin? ☐ Yes ☒ No

Do you have any physical defects? ☐ Yes ☒ No

Are you under the care of a doctor or dentist? ☒ Yes ☐ No f/ Suboxon

Are you taking any medication or drugs? ☒ Yes ☐ No Suboxon /

Attitude: cooperative

Coordination: Normal

Speech: Clear

Breath odor: bad

Face: ~~[illegible]~~ Normal

Corrective Lenses: ☒ None ☐ Glasses ☐ Contacts, if so ☐ Hard ☐ Soft

Eyes: ☒ Normal ☐ Bloodshot ☐ Watery

Blindness: ☒ None ☐ Left ☐ Right

Tracking: ☒ Equal ☐ Unequal

Pupil Size: ☒ Equal ☐ Unequal (explain)

Resting Nystagmus: ☐ Yes ☒ No

Vertical Nystagmus: ☐ Yes ☐ No

Able to follow stimulus: ☒ Yes ☐ No

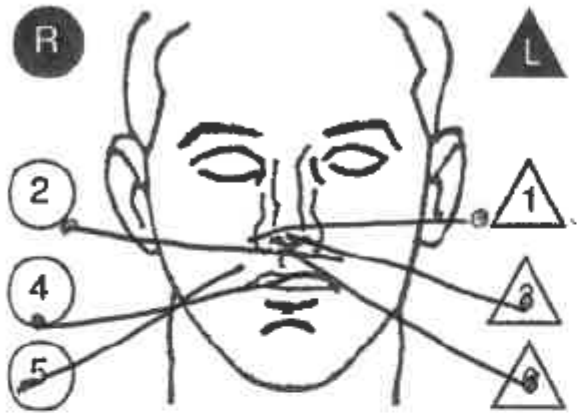
Eyelids: ☐ Normal → ☒ Droopy

observer Dr Harper

ran out month ago

Dosing

Finger to Nose
(Draw lines to spots touched)



slow

head coming down slow Rigid

PUPIL SIZE	Room light (2.5 – 5.0)	Darkness (5.0 – 8.5)	Direct (2.0 – 4.5)
Left Eye	2.0	2.0	2.0
Right Eye	2.0	2.0	2.0

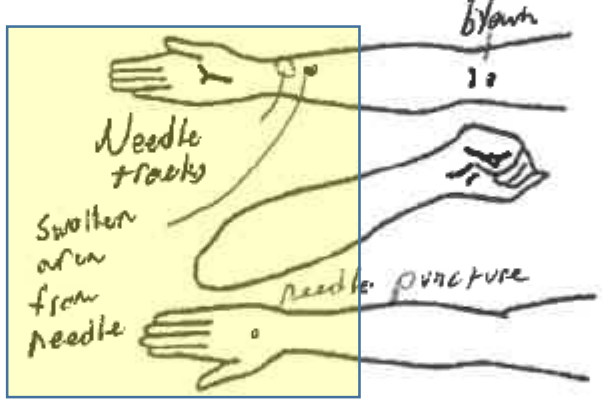
Nasal area: hairy

Oral cavity: clear very dry mouth

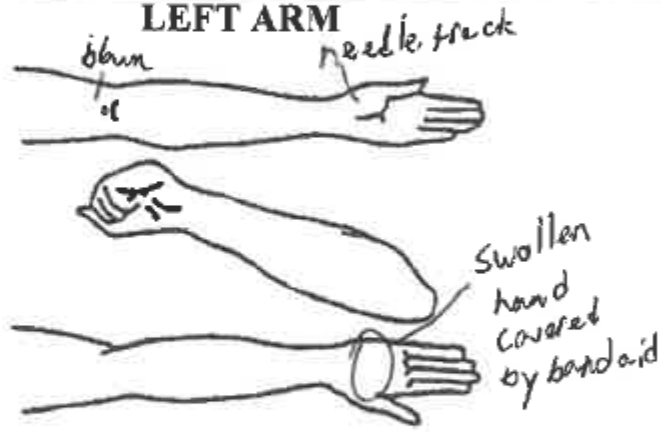
Rebound Dilation: ☐ Yes ☒ No

Reaction to Light: None

RIGHT ARM



LEFT ARM



Blood Pressure	Temperature
140 / 82	98.3 °F

Muscle Tone: ☒ Normal ☐ Flaccid ☐ Rigid

Comments:

What drugs or medications have you been using? Heroin / Meth

How much? ½ bag mixed ice & heroin

Time of use? 1000 am

Where were the drugs used? (Location) Right wrist

Date / Time of arrest:	Time DRE was notified:	Evaluation start time:	Evaluation completion time:
9/10/18 1511	1515	1610	1704

☐ Subject refused entire evaluation
☐ Subject stopped participating during evaluation

Officer's Signature: [redacted]

Reviewed/approved by / date:

DRE #

Opinion of Evaluator:

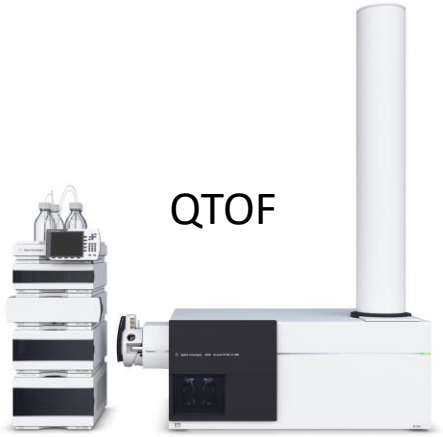
☐ Not Impaired	☐ Alcohol	☒ CNS Stimulant	☐ Dissociative Anesthetic	☐ Inhalant
☐ Medical	☐ CNS Depressant	☐ Hallucinogen	☒ Narcotic Analgesic	☐ Cannabis

UPDATED 3/2018 JP

Case Study #1: Toxicology Results

Target	Blood (ng/mL)	Oral Fluid (ng/mL)
Methamphetamine	780	>1000 (4,700)
Amphetamine	51	900
Fentanyl	12	52
Morphine	ND*	37
6-MAM	ND	P

* Qualifier out of tolerance. ~ 5 ng/mL



QTOF

DRE Evaluation: Narcotic Analgesic, CNS Stimulant

Case Study #2 Watch the Fence

- White, Male, 24 year old
- Subject drove his vehicle off the road and into a chain link fence.
- Time of Crash: 10:00 PM
- DRE Evaluation/OF Sample: 11:30 PM (1.5 hours post-crash)
- Time of Blood Draw: 12:43 AM (2.75 hours post-crash)
- Alere DDS2 – THC, Stimulant, Benzo, Opiates
- Draeger DT5000 - THC, Stimulant, *Invalid
- DRE Evaluation: Cannabis + CNS Stimulant

ALABAMA
DRUG INFLUENCE EVALUATION

EVALUATOR: [redacted]

IACP# 025222 ROLLING LOG#: 16-073

CASE NUMBERS: [redacted]

SCRIBE: none

TYPE EVALUATION: ENFORCEMENT

WITNESS: [redacted]

ARRESTEE'S NAME (Last, First, Middle)	Date of Birth	Age	Sex	Race	Arresting Officer (Name, ID#)
[redacted]	2/19/92	24	m	w	[redacted]

Date Examined / Time /Location: 12/29/16 / 2330 / mc Jail

Breath Results: Test Refused ☐
Results: .000 Instrument #: 099328

Chemical Test: Urine ☐ Blood ☒
Test or tests refused ☐

Miranda Warning Given ☒ Yes ☐ No
Given By: M. Nelson

What have you eaten today? When? Mexican Dinner

What have you been drinking? How much? water 8-10 bottles

Time of last drink? not sure

Time now/ Actual: After 2 / 2337

When did you last sleep? How long: 0300 - 0900

Are you sick or injured? ☒ Yes ☐ No Psych

Are you diabetic or epileptic? ☐ Yes ☒ No

Do you take insulin? ☐ Yes ☒ No

Do you have any physical defects? ☐ Yes ☒ No

Are you under the care of a doctor or dentist? ☒ Yes ☐ No normal stuff

Are you taking any medication or drugs? ☒ Yes ☐ No Xanax, Trazodone, Advil, Marijuana

Attitude: Cooperative, confused

Coordination: Poor, staggering, stumbling

Speech: Low, thick, and slurred

Breath Odor: Normal

Face: Normal

Corrective Lenses: ☐ None Prescription I think ☒ Glasses ☐ Contacts, if so ☐ Hard ☐ Soft

Eyes: ☐ Reddened Conjunctiva ☐ Normal ☒ Bloodshot ☒ Watery

Blindness: Its Coming ☒ None ☐ Left ☐ Right

Tracking: ☒ Equal ☐ Unequal

Pupil Size: ☒ Equal ☐ Unequal (explain)

Vertical Nystagmus ☐ Yes ☒ No

Able to follow stimulus ☒ Yes ☐ No

Eyelids ☐ Normal ☒ Droopy

Pulse and time		
1.	132	2344
2.	126	0006
3.	134	0014

HGN	Right Eye	Left Eye
Lack of Smooth Pursuit	Normal	Normal
Maximum Deviation	normal	normal
Angle of Onset	None	none

Convergence

Right eye Left eye

ONE LEG STAND

no no

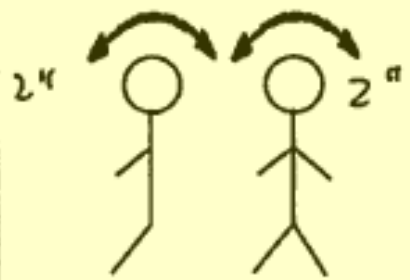
L R L R

L R
- ■ ■ Sways while balancing
- ■ ■ Uses arms to balance
- ■ ■ Hopping
- □ ■ Puts foot down

Tremors <6" sway Arms Hopping

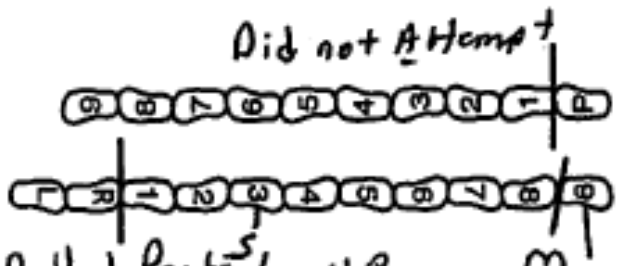
Tremors Down 1X

Romberg Balance



2X - Gymnastics raised toward Left/Right Stated 45

Walk and turn test



Demonstrate turn 2X Tremors
Slow sway
Pivoted turn
Wrong Feet placement

	1st Nine	2nd Nine
Cannot keep balance	5X	
Starts too soon	no	
Stops walking	1X	
Misses heel-toe	1X	
Steps off line	1X	
Raises arms	1X	
Actual steps taken	9/12	

Internal clock estimated as 30 seconds: 46

Describe Turn: NONE

Cannot do test (explain): Fell over, could not finish

Type of footwear: Sock Feet

Nasal area: clear

Oral cavity: Raised taste buds Green coating

Draw lines to spots touched

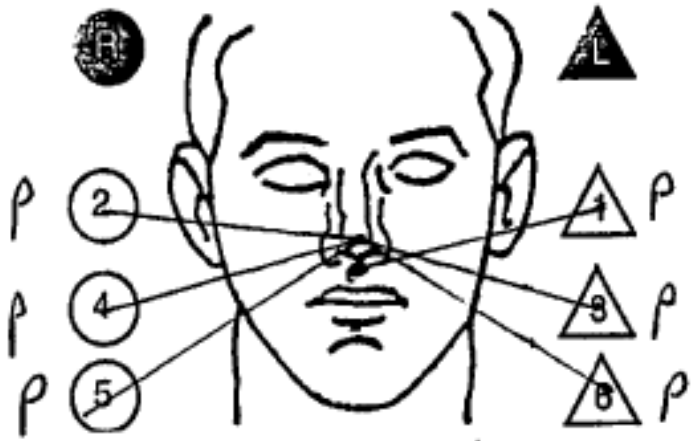
PUPIL SIZE	Room light 2.5 – 5.0	Darkness 5.0 – 8.5	Direct 2.0 – 4.5
Left Eye	6.0	7.5	4.5
Right Eye	6.0	7.5	4.5

pupillary Unrest

REBOUND DILATION □ Yes ■ No

REACTION TO LIGHT: Slow

Draw lines to spots touched



PUPIL SIZE	Room light 2.5 – 5.0	Darkness 5.0 – 8.5	Direct 2.0 – 4.5
Left Eye	6.0	7.5	4.5
Right Eye	6.0	7.5	4.5

Nasal area: clear

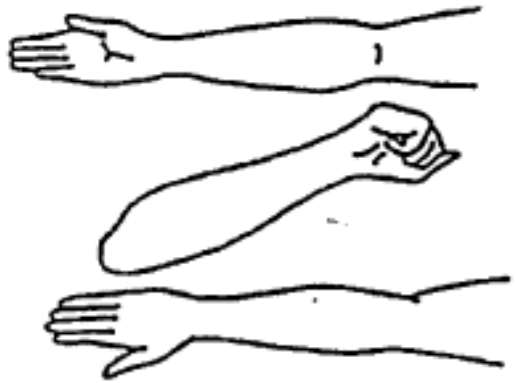
Oral cavity: Raised taste buds Green Coating

pupillary Unrest

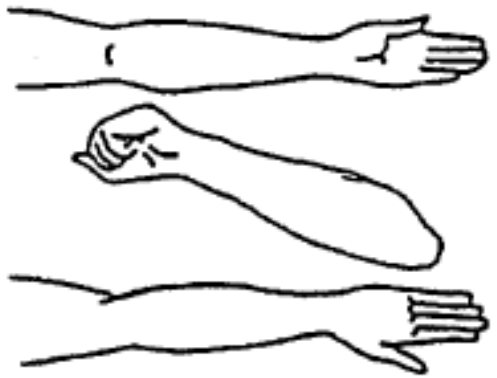
REBOUND DILATION ☐ Yes ■ No

REACTION TO LIGHT: Slow

RIGHT ARM



LEFT ARM



Blood pressure	Temperature
130 / 96	98.6°

Muscle tone: ☐ Normal ☐ Flaccid ■ Rigid

Comments:

What drugs or medications have you been using? Xanax Cocaine

How much? One Line, Xanax pills Methadone

Time of use? PM

Where were the drugs used? (Location) @ home

Date / Time of arrest:	Time DRE was notified:	Evaluation start time:	Evaluation completion time:	Precinct/Station:
12/29/16 2317	2310	2330	0030	500

Opinion of Evaluator: ☐ Depressant ■ Stimulant ☐ Hallucinogen ☐ Dissociative Anesthetic ☐ Narcotic Analgesic ☐ Inhalant ■ Cannabis ☐ Alcohol ☐ Alcohol Rule Out ☐ Medical Rule Out ☐ Unable to Determine Category ☐ No Impairment

Officer's Signature: [redacted]

Felony Offense: NONE

Misdemeanor Offense: DUI

Reviewed/approved by / date:

Revised. 06/10

[redacted]

Case Study #2: Toxicology Results

Target	Blood (ng/mL)	Oral Fluid
THC	ND	315
THC-OH	ND	ND
THC-COOH	18	ND
Cannabigerol (CBG)	ND	14
Cannabinol (CBN)	ND	19
Cannabidiol (CBD)	ND	ND
Methamphetamine	560	>1000
Amphetamine	55	>1000
Cocaine	ND	66
BE	75	456
Alprazolam	150	>1400
Morphine	ND*	1470

Specimen taken proximate to time of driving: How close?

- Roadside – immediately after arrest
- Prior to DRE evaluation
- After DRE evaluation
- After search warrant, simultaneously with blood at hospital

- Considerations
  - Consent
  - Implied Consent Law
  - Search Warrant
    - *Birchfield v. North Dakota*
  - Case Law
  - Discuss with your TSRP or Local DA

Case Study #3 Know your Limitations

- White, Male, 28 year old
- Struck a drive-thru while operating vehicle
- Time of Crash: 11:15 PM
- DRE Evaluation/OF Sample: 12:25 AM (~1 hours post-crash)
- Time of Blood Draw: 11:53 PM (0.75 hours post-crash)
- Alere DDS2 – Negative
- Draeger DT5000 - Negative
- DRE Evaluation: Depressant

Case Study #3 - Toxicology Results

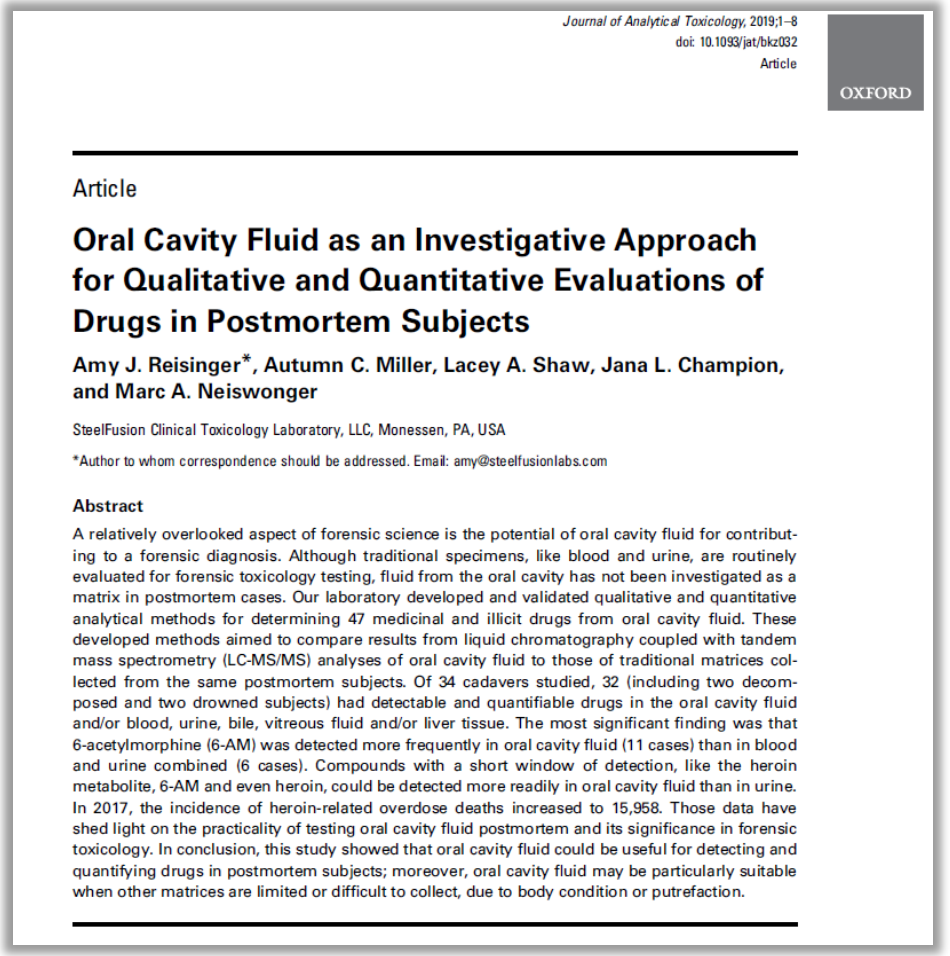
Target	Blood (ng/mL)	Oral Fluid (ng/mL)
Diazepam	180	ND*
Nordiazepam	97	4*
Zolpidem	390	130

* Alere DDS2 & Draeger DT5000 were negative.

* Highlights limitations of OF roadside screening and confirmation testing.

Our Future Aims

- Hamilton Starlet Extraction Automation = OF, Blood methods
- In the process of evaluating DrugWipe
- Newly designed BSKits = 2,500 per year.
- Quantitative results for cannabinoids
- Postmortem:
  - Traffic Fatalities, Suspected ODs



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Article

OXFORD

Article

Oral Cavity Fluid as an Investigative Approach for Qualitative and Quantitative Evaluations of Drugs in Postmortem Subjects

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Abstract

A relatively overlooked aspect of forensic science is the potential of oral cavity fluid for contributing to a forensic diagnosis. Although traditional specimens, like blood and urine, are routinely evaluated for forensic toxicology testing, fluid from the oral cavity has not been investigated as a matrix in postmortem cases. Our laboratory developed and validated qualitative and quantitative analytical methods for determining 47 medicinal and illicit drugs from oral cavity fluid. These developed methods aimed to compare results from liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) analyses of oral cavity fluid to those of traditional matrices collected from the same postmortem subjects. Of 34 cadavers studied, 32 (including two decomposed and two drowned subjects) had detectable and quantifiable drugs in the oral cavity fluid and/or blood, urine, bile, vitreous fluid and/or liver tissue. The most significant finding was that 6-acetylmorphine (6-AM) was detected more frequently in oral cavity fluid (11 cases) than in blood and urine combined (6 cases). Compounds with a short window of detection, like the heroin metabolite, 6-AM and even heroin, could be detected more readily in oral cavity fluid than in urine. In 2017, the incidence of heroin-related overdose deaths increased to 15,958. Those data have shed light on the practicality of testing oral cavity fluid postmortem and its significance in forensic toxicology. In conclusion, this study showed that oral cavity fluid could be useful for detecting and quantifying drugs in postmortem subjects; moreover, oral cavity fluid may be particularly suitable when other matrices are limited or difficult to collect, due to body condition or putrefaction.