

2019 APAAC Annual Prosecutor Conference
June 19-21, 2019
Arizona Grand Resort & Spa
Phoenix, Arizona



Arizona DPS Crime Laboratory:
21st Century Innovation

Presented By:

STEPHEN BUTLER

Crime Laboratory Manager, AZ DPS

&

SCOTT REX

Crime Laboratory Manager, AZ DPS

Distributed by:

Arizona Prosecuting Attorneys' Advisory Council

1951 West Camelback Road, Suite 202

Phoenix, Arizona

ELIZABETH BURTON ORTIZ

EXECUTIVE DIRECTOR

Arizona DPS Crime Laboratory: 21st Century Innovation

Scott Rex and Steve Butler
Arizona Department of Public Safety

1

Topics for Today

- ◆ DNA Advancements
 - ◆ Rapid DNA
 - ◆ Familial DNA
- ◆ Toxicology Program Update

2

Rapid DNA

- ◇ Rapid DNA is an automated process of developing a DNA profile from a sample (either from a crime scene or a person) using a single instrument that completes the analysis in a short period of time
 - ◇ Typically less than two hours from start to finish

3

Traditional Forensic DNA Analysis

- ◇ 4 steps
 - ◇ Extraction
 - ◇ Quantitation
 - ◇ Amplification
 - ◇ Analysis
- ◇ Each step requires hands-on by a scientist and/or the use of instrumentation
- ◇ Total time for steps averages 16-18 hours
- ◇ Can handle all types of DNA samples

4

Traditional Forensic DNA Analysis

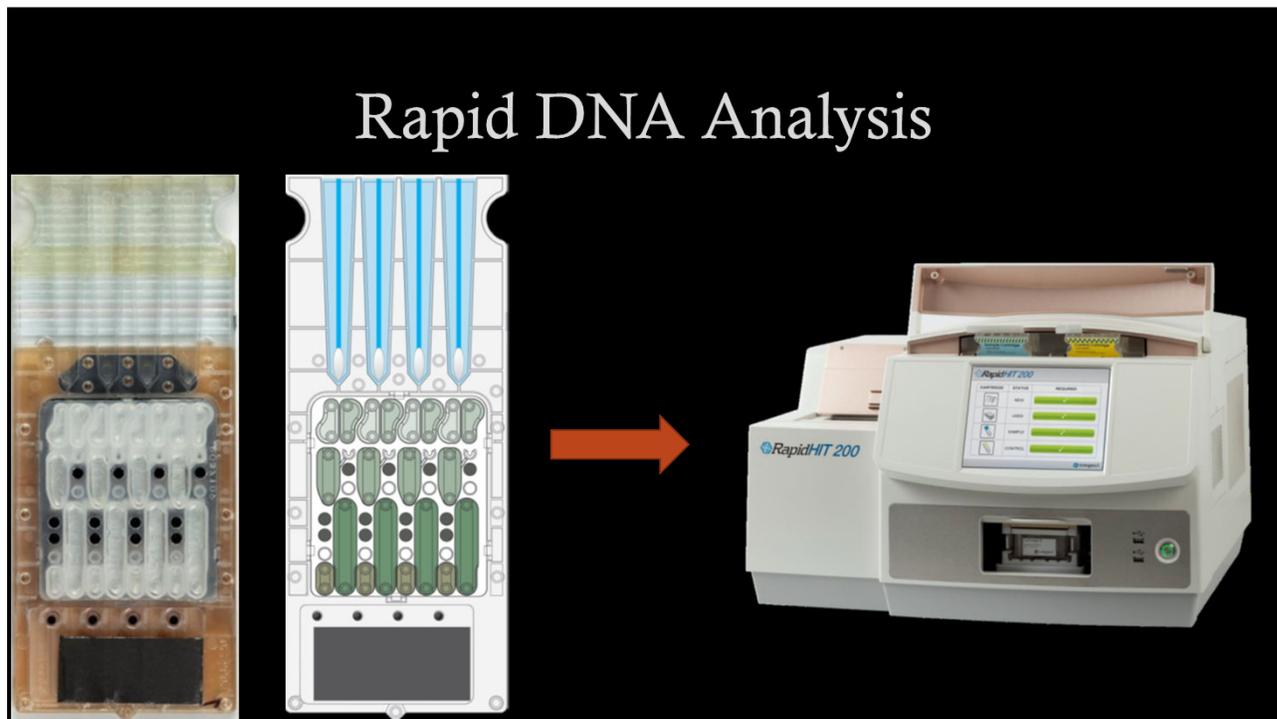


5

Rapid DNA Analysis

- ◇ 3 Steps
 - ◇ Extraction
 - ◇ Amplification
 - ◇ Analysis
- ◇ All steps completed by one instrument
- ◇ Total time for steps is two hours or less
- ◇ Focused on single source samples

6



7

How is AZDPS Using Rapid DNA?

- ◇ Rapid Officer Program
- ◇ Booking Station Pilot Program
- ◇ Rapid Arrestee Program

8

Rapid Officer Program

- ◆ Started in April 2014
- ◆ Officers or crime scene technicians go through training course on sample collection and use of instrument to become Rapid Operators
- ◆ Samples from scenes are run by operators and searched against state-maintained database for possible matches
- ◆ Investigative leads can be developed within two hours
- ◆ AZDPS is the only agency nationwide utilizing the technology in this way at a statewide level

9

Rapid Officer Program

- ◆ Has been utilized in more than 400 cases statewide since 2014
- ◆ Has resulted in nearly 150 investigative leads

10

Examples of Investigations Aided by Rapid DNA

- ◆ Officer involved shooting – Central Phoenix
 - ◆ Match to one of five suspects in case through blood
- ◆ Bank robbery – Southern AZ
 - ◆ Match through swab of sunglasses
- ◆ Child molestation – East Valley
 - ◆ Match to family friend through semen
- ◆ ID of body found in desert – West Valley
 - ◆ Aided investigation for two agencies with one test
- ◆ Breaking and entering sex assault – West Valley
 - ◆ Suspect identified within 6 hours of incident through semen

11

Booking Station Pilot Program

- ◆ Arizona is one of five participating states for FBI Booking Station Pilot Program with AZDPS taking lead role
- ◆ Pilot to test efficacy of running swabs at the time of arrest at booking stations using Rapid technology for immediate upload into a special database in CODIS housing most serious offenders
- ◆ If successful, will result in:
 - ◆ Policy shifts within the FBI regarding CODIS
 - ◆ Potential for Rapid identification of serious offenders at time of arrest
 - ◆ Changes in how database labs function nationwide

12

Rapid Arrestee Program

- ◆ DPS preparing to launch program for Rapid testing of priority arrestee samples
- ◆ If agency has a priority arrestee sample (someone they need information on ASAP), they can bring it to the lab directly
- ◆ Lab will run and review sample for immediate entry into CODIS – within 2 hours of receiving sample
- ◆ Information can be provided quickly to agency
- ◆ AZDPS will be one of the first agencies nationwide to utilize the technology in this way
- ◆ Has potential to expand to all arrestees in future
- ◆ May be used to compliment booking station program in future

13

Familial DNA Program

- ◆ Familial DNA analysis consists of a deliberate search of Arizona Convicted Offender and Arrestee DNA profiles to identify candidates who are potential close biological relative to an unknown perpetrator.
 - ◆ Uses a statistical comparison to find candidates who have a higher likelihood of being relatives
 - ◆ Additional analysis, including male DNA testing, is then completed to further determine relatedness and narrow down the list
 - ◆ Typically a low rate of success (10-15% nationwide)
 - ◆ Arizona is the 12th state to implement a familial program

14

Oh, like the Golden State Killer case?

NO

15

Familial vs. Genealogical Analysis

- ◇ Familial DNA –
 - ◇ Conducted by crime lab using samples collected for law enforcement purposes
 - ◇ These are forensic samples looking at specific locations on the DNA to establish identity
 - ◇ Focused on linking parents to children or linking full siblings
- ◇ Genealogical DNA
 - ◇ Online searches performed by investigators and/or contracted companies using public ancestry databases
 - ◇ Samples from these websites look at a larger portion of the human genome to determine heredity, ethnicity, and potential relatives
 - ◇ Can match more distant relatives to one another

16

DPS Familial Program

- ◇ 11 cases worked through April 2019
 - ◇ 6 analyses resulting in no leads
 - ◇ 1 withdrawn prior to completion due to regular hit in CODIS
 - ◇ 2 fingerprint IDs completed prior to familial analysis leading to closing of one case and arrest of suspect in a second case
 - ◇ 1 case resulting in a potential lead that has not been verified as yet by the submitting agency
 - ◇ 1 case that provided a lead resulting in the arrest of a suspect
 - ◇ 2015 homicide of Allison Feldman in Scottsdale

17

Questions on Advancements in DNA?

18

Arizona DPS Toxicology

Central Regional
Crime Laboratory
(Phoenix)

Blood Toxicology
Blood Alcohol
Breath Alcohol

Southern Regional
Crime Laboratory
(Tucson)

Blood Toxicology
Blood Alcohol

Northern Regional
Crime Laboratory
(Flagstaff)

Urine Toxicology
Blood Alcohol

Western Regional
Crime Laboratory
(Lake Havasu City)

Blood Alcohol



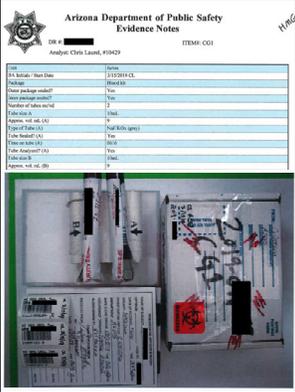
19

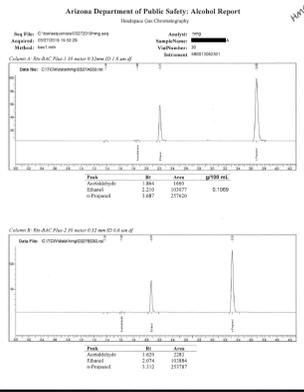
Alcohol Workflow

Evidence Documentation

Analysis

Reporting





Peak	RT	Area	#100 mL
1	1.141	11251	0.1000
2	1.210	10517	0.1000
3	1.447	217420	0.1000



RESULTS/INTERPRETATIONS
CO1.A Analysis of the specimen showed it to contain 0.107 ± 0.008 grams of ethanol per 100 mL of blood.

20

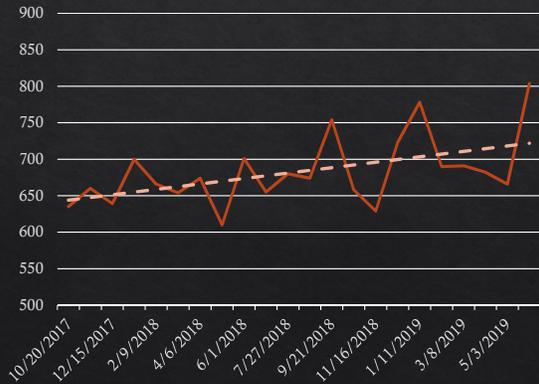
Toxicology Workflow



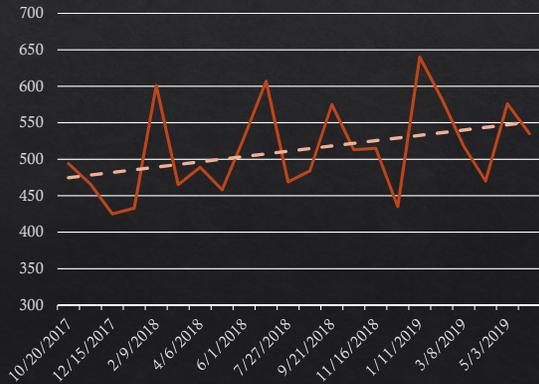
21

Case Submissions

Total Blood Alcohol Cases Submitted

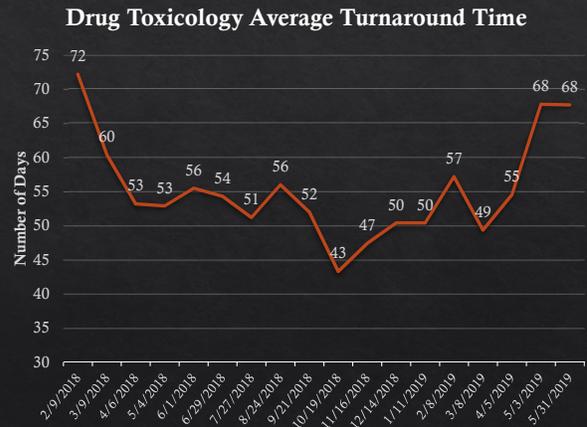
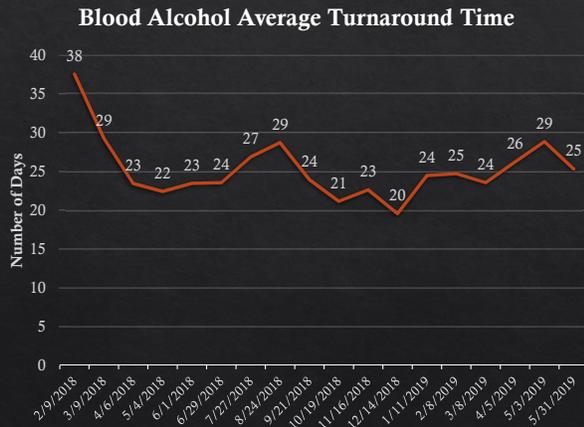


Total Toxicology Cases Submitted



22

Turnaround Times



23

Continual Improvement

Lean Six Sigma

- ◆ Combination of two methodologies
 - ◆ Lean – Reduce waste (elimination of non-value-added activities)
 - ◆ Six Sigma – Reduce variation (improve value-added activities)
- ◆ Systematic process
 - ◆ One step at a time – don't jump steps
 - ◆ Collaborative team effort
 - ◆ Don't assume your idea is the best idea
- ◆ Based on customer needs/requirements
 - ◆ Who is our customer? Who defines requirements?



24

Continual Improvement

Q-TOF

- ◆ Phoenix and Tucson
- ◆ Targeted vs. non-targeted analysis
- ◆ Larger menu of compounds we can identify
- ◆ Potential to replace preliminary testing



25

Continual Improvement

- ◆ Comparing drug trends with laboratory methods to ensure we are staying relevant
- ◆ Identify funding sources to replace aging equipment
- ◆ Process changes to improve turnaround times



26

Questions

Scott Rex
srex@azdps.gov

Steve Butler
sbutler@azdps.gov