



**2018 Rapid DNA Maturity Assessment**

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Applied Genetics Group NIST  
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Phoenix, Arizona


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**Disclaimer**



- NIST falls within the Department of Commerce
  - Mission: to promote innovation and industrial competitiveness by advancing measurement science, standards, and technology
- Our focus is on making measurements
  - Robust examinations of technology
  - Collaboration with other federal/state/local users
  - Collaboration with industry
- NIST is not a consumer reports agency for commercial products

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**2018 Rapid DNA Maturity Assessment**

- **Goal:** To measure the status of rapid DNA typing technology for the 20 CODIS core loci in support of booking station Rapid DNA implementation
- Rapid DNA instruments capable of genotyping the 20 CODIS core loci were eligible for participation
- 20 single source reference buccal swabs were distributed to participating laboratories

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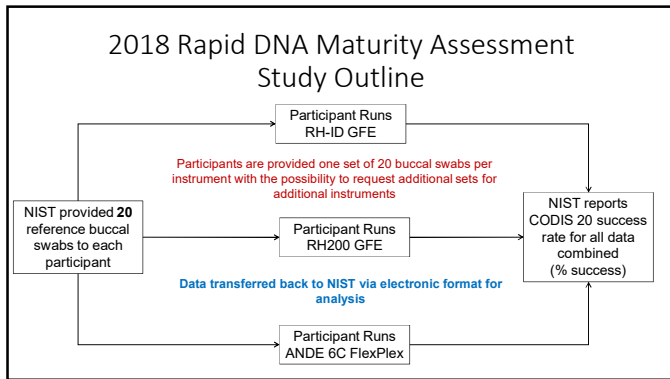
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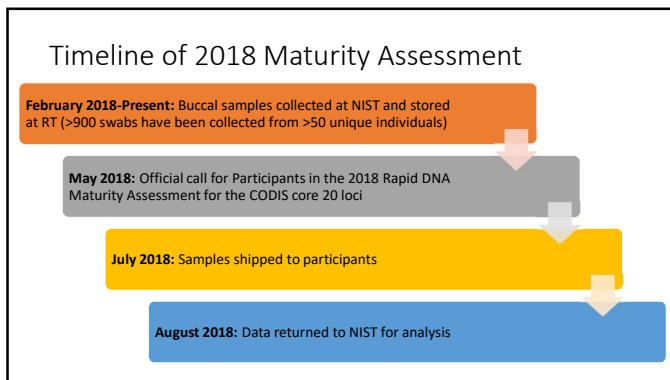
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20 Swabs provided

Participants (9)	Instrument Platforms (3)	Independent Instruments (12)	Chemistry	Total Samples Tested (240)	Analysis Method
Federal		5	FlexPlex	100	Rapid DNA Analysis
State		3	GlobalFiler Express	60	Modified Rapid DNA Analysis
Police		4	GlobalFiler Express	80	Modified Rapid DNA Analysis

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### Success Metrics

- Success was measured by **complete and concordant genotypes** produced for the 20 CODIS core loci
- Allele calls by the integrated rapid DNA devices were compared to lab generated profiles for concordance
  - Fusion 6C, PP21, GFE on a 3500xL
- Two interpretation parameters were implemented
  - Rapid DNA Analysis: **Without human intervention**
  - Modified Rapid DNA Analysis: **Expert interpretation and analysis of electropherogram**

<https://www.fbi.gov/file-repository/addendum-to-qas-for-rapid-dna.pdf/view>

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### Rapid DNA Analysis-ANDE

Automated (lights-out) analysis without human intervention

Effective June 1, 2018, the following Rapid DNA system is approved for use at NDIS by an accredited forensic DNA laboratory:

Rapid DNA Analysis System for Accredited Laboratory Use

Component	Name	Part/Version Number
Rapid DNA Instrument	ANDE 6C Instrument	A0120001000
Typing Kit	FlexFlex27	FlexFlex27
Cartridge	ANDE A-Clip (FlexFlex)	A0210001057
System Software	ANDE System Software	2.0.6
Expert System Software	ANDE Expert System	2.0.5

ANDE 6C is the only instrument to date to be NDIS approved for automated rapid DNA analysis

<https://www.fbi.gov/services/laboratory/biometric-analysis/codis/rapid-dna>

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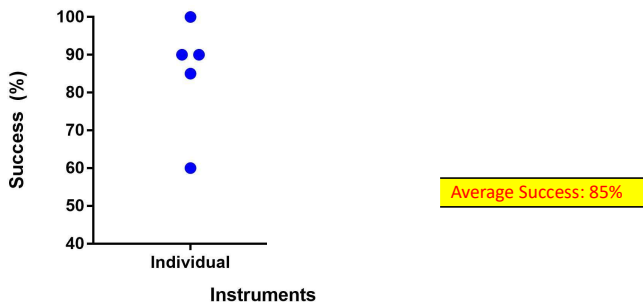
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### CODIS 20 Success: Automated Analysis

n=85




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### Modified Analysis Parameters

- Samples were manually reviewed (n=240)
  - ANDE profiles were analyzed in GeneMapper IDX v1.5
  - RapidHIT profiles were reviewed in GeneMarker HID v2.8.2
  - Heterozygote balance filter set at 0.25
- After manually interpreting a profile (PHR >0.25, low AT, recovery of "lost" data), concordance was checked against the laboratory generated reference profile
- Success was determined by **complete and concordant** profiles for the 20 CODIS core loci

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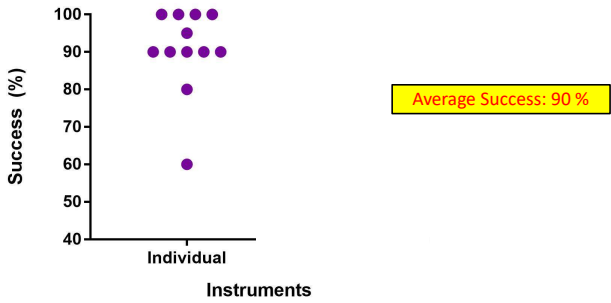
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### CODIS 20 Success: Modified Analysis

n=217



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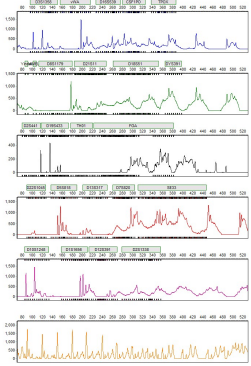
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### Unrecovered Samples n=23



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**Unrecovered Samples**  
n=23

**Instrument Related**

Unknown n=9  
Data Transfer Failure n=2

Name	Date modified	Type
DannoGUI(State.xml)	8/21/2018 2:51 PM	XML Document
GetFill_MV_(14.23).png	8/21/2018 2:51 PM	PNG File
StoryBoard_(14.23).txt	8/21/2018 2:51 PM	Text Document
SyringePump_(14.23).csv	8/21/2018 2:40 PM	Microsoft Excel C...

No data was transferred from the instrument to analyze

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**Unrecovered Samples**  
n=23

**Instrument Related**

**Partial Profile**  
n=10

Unknown n=9  
Data Transfer Failure n=2

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**Unrecovered Samples**  
n=23

**Instrument Related**

**Partial Profile**  
n=10

Unknown n=9  
Data Transfer Failure n=2  
**Single Locus Dropout**  
n=2

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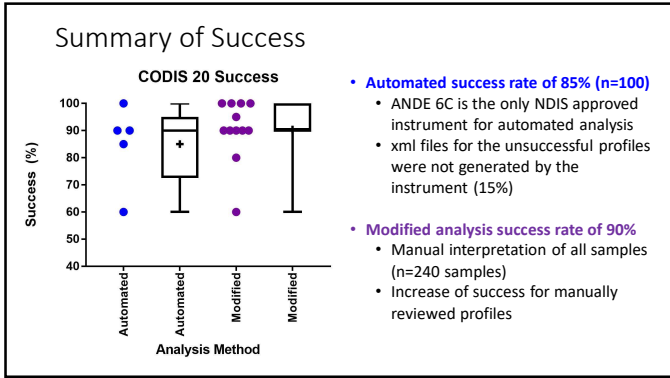
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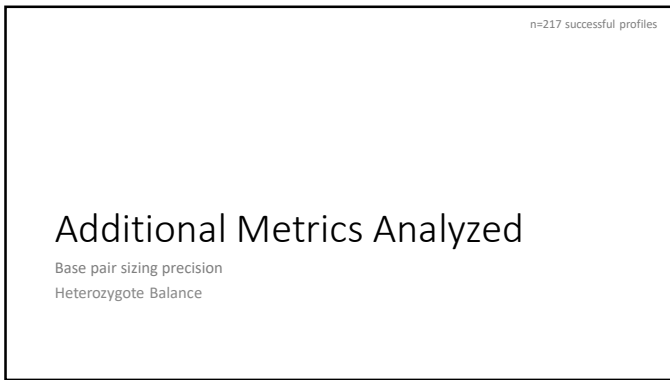
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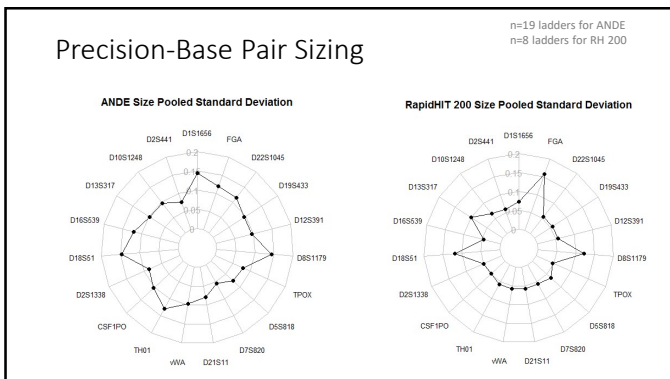
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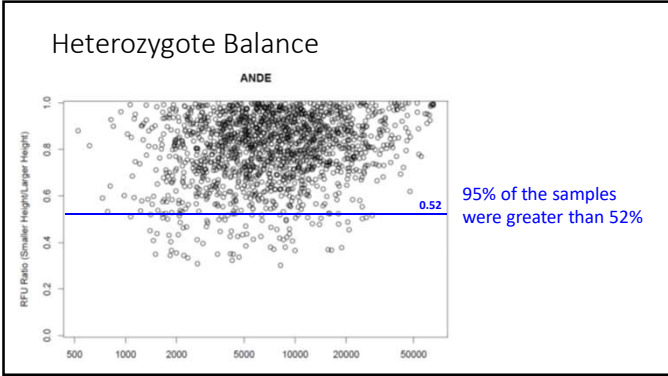
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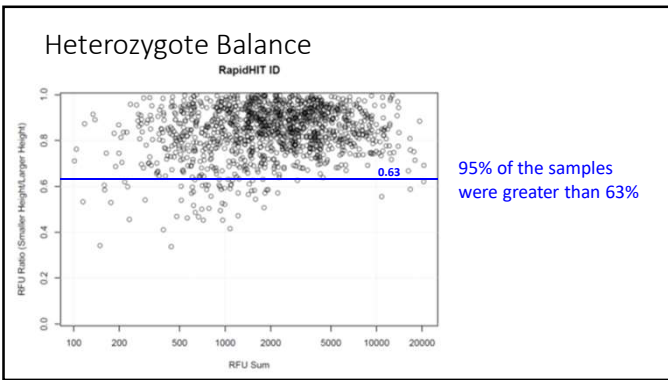
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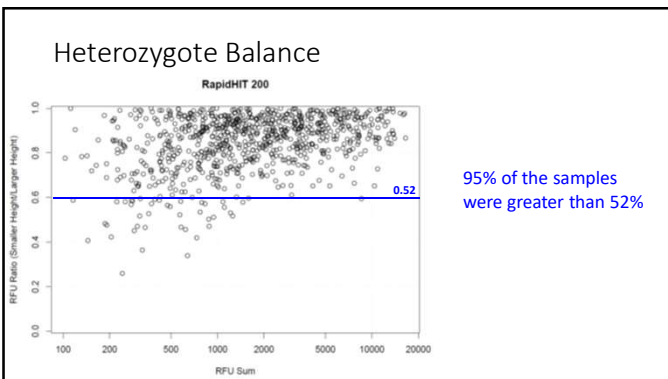
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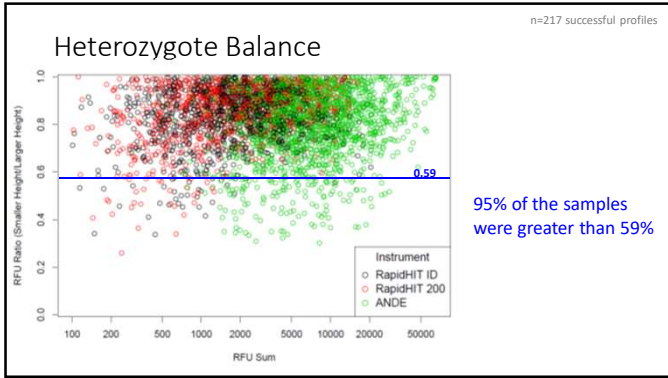
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- ### Maturity Assessment Summary
- 12 instruments tested across 9 laboratories
  - Total of 240 samples examined
    - 85% success rate for the CODIS 20 using **Rapid DNA Analysis**
    - 90% success rate for the CODIS 20 using **Modified Rapid DNA Analysis**
    - Success ranged from 60% to 100%
    - Precision was below 0.17 bp on for both ANDE 6C and RapidHIT 200
    - Combined heterozygote balance (all three instruments) was above 59%

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### Thank you to our participants

- ANDE
- Arizona Department of Public Safety
- Bensalem Police Department
- Federal Bureau of Investigation Laboratory
- Louisiana State Police Crime Laboratory
- Miami Beach Police Department
- Miami Dade Police Department
- NIST (DHS instruments, run at SNA Intl.)
- U.S. Army Criminal Investigation Laboratory

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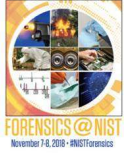
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# Acknowledgements

Save the Date!



- November 7
  - Keynote: John Butler
  - Forensic Genetics
  - Fingerprints
  - Digital & Multimedia
  - Footwear Impression
- November 8
  - Keynote: Shella Willis
  - Trace Evidence
  - Drugs and Toxins
  - Firearms and Tool Marks

**NIST – Applied Genetics Group**  
**Peter Vallone**  
**Steven Lund**

**Funding**  
FBI Biometrics Center of Excellence: Forensic DNA Typing as a Biometric tool.

**Contact Information**  
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Rapid DNA Instrument	Number of Participating Labs	Total Instruments	Samples Attempted	CODIS Success (Rapid DNA Analysis)	CODIS Success (Modified Rapid DNA Analysis)
3	9	12	240	85%	90%

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