Outline

- DNA Profiles
- Rapid DNA testing
- Series of Rapid DNA interlaboratory assessments
- Summary

This is a DNA profile generated in a laboratory (traditional setting)

Profile generated from a high quality single source sample
1 or 2 peaks present at all markers
Strong signal (good signal to noise)
Well balanced between and within a STR marker
Limited artifacts that could be confused with 'noise'

This is a DNA profile generated from a high quality single source sample

All allele calls can be extracted from this data

This is a DNA profile generated in a laboratory (traditional setting)

Profile generated from a mixed sample
1 or more peaks present at all markers
Signal varies for major and minor contributors
Requires a higher level of interpretation

This is a DNA profile generated in a laboratory (traditional setting)
Rapid DNA Instruments

- Generate a DNA profile in less than 2 hours
- ‘Hands off’ operation (‘swab in – profile out’)
- Profile can be interpreted manually or by expert software

Interlaboratory Study

- Interlaboratory studies are collaborative exercises by laboratories to assess or improve the quality for their measurements. They can be applied with a research or teaching objective but they can also be used to assess the performance of a normalized method or the ability of a laboratory to perform a given task.

- Rapid DNA example: NIST sends out swabs to participating labs
  - Labs run the samples (possibly interpret data)
  - Return the results to NIST
  - Compare to ground truth and report success/performance

Success Criteria

- Correct typing of the US core markers
  - 13 STR markers
  - 20 STR markers (current)

- Working with high quality single source samples
  - Criteria: Correct typing of the core STR markers
  - No partial credit
  - Example in table: 44/50 = 88% success
Initial Rapid DNA Testing

- Fall 2012 – prototype testing at NIST (DHS instruments: ANDE, IntegenX)
  - Concurrent testing at the FBI and DFSC
- Initial testing success rates were low 30%
- Feedback and rounds of optimization
  - Rapid DNA cartridge
  - Shipping
  - Rapid DNA hardware
  - Software (instrument, data collection and interpretation)
- By July 2013 success levels were > 75%; green light for interlaboratory assessments

Rapid DNA Assessment I

- August 2013
- Core 13 STR markers
- Three laboratories
  - NIST/DHS, FBI, DFSC
- ANDE (4) and IXI platforms (3)
- 50 samples per lab (single source swabs)
- 350 samples (total)

Rapid DNA Assessment II

- Fall 2014
- Core 13 STR markers (the new core 20 STR markers were attempted by some labs)
- Seven labs – NIST/DHS, FBI, DFSC, DIA, NMS, SOCOM, CA DOJ
- ANDE (5) and IXI (6) platforms; 11 total
- 20 samples per lab (single source swab)
- 280 samples (total)

Rapid DNA Assessment III

- Spring 2018
- Core 20 STR markers
- Projected: 8 labs and 2 vendors
- ANDE and IXI platforms (new kits, configurations)
- 20 samples per lab (single source swab)
- Currently collecting single source swabs
NIST Applied Genetics Group
Rapid DNA Maturity Assessment 2018
To measure the status of rapid DNA typing technology for the 20 CODIS core loci
In support of lab and booking station rapid DNA implementation

Requirements for Participation

Participants
• Contact Erica Romsos of desired participation in the 2nd Rapid DNA Maturity Assessment
• Establish Material Transfer Agreement (MTA) with NIST for transfer of samples to each participating lab
• Participants are responsible for purchasing kits/cartridges
• Chemistry must contain 20 CODIS Core Loci

NIST
• Collect and characterize buccal reference samples
• Shipment of samples to all participants
• Collection, retention, analysis of data from all participants
• Through a NIST provided FTP site
• Reporting success metrics to Rapid DNA community

Questions? Contact Erica Romsos (NIST): erica.romsos@nist.gov

Summary
• Assessment I
  • 13 markers, 3 labs, 2 platforms, 7 total instruments
  • Average success 88%
• Assessment II
  • 13/20 markers, 7 labs, 2 platforms, 11 total instruments
  • Average success ranged between 70% - 80%
• Assessment III
  • 20 markers, 10 labs, 2 platforms, 7 total instruments
  • Spring/Summer 2018

General comments
Using kits tuned for an excess of DNA contamination was not observed (so far)
If a profile wasn’t successful – the result was typically missing or partial information (not incorrect profiles)

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