# Use of a Database Feature in the TrueAllele® Casework System to Cross Compare DNA Cases

Dr. Nasir Butt, Ph.D.* and Jeffrey Oblock, B.S.,

Cuyahoga County Medical Examiner's Office
11001 Cedar Avenue
Cleveland, Ohio 44106
(216) 721-5610

## The History

- Spike in auto thefts in multiple westside suburbs of Cleveland, Ohio in the summer and fall of 2015
- Believed to be committed by the same gang of juveniles
- Most vehicles stolen over night from driveways or from the street
- Vehicles were unlocked or windows smashed
- Steering columns "peeled" or keys left inside vehicle



## The Numbers

- 37 separate incidents/cases submitted for testing
- 6 different jurisdictions
- 161 total evidence samples
  - Swabs from various areas of recovered autos
  - Personal property left behind
- 38 suspect reference samples collected during gang "round up" (72 total references)

THESE ARE BUCCAL SWABS COLLECTED FROM SUSPECTS RELATED TO THE METROPARKS ROBBERY (15-5033) AND RELATED WEST SIDE CRIME RING/GANG INVEST.

## The Challenge

- Efficiently cross-compare 38 suspect references to each of the 37 cases/100+ evidence samples
  - Manual interpretation done using in-house protocols with RMP/CPI
    - Many man hours of desk work
    - Ignoring profiles/data

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## Manual Interpretation

- Threshold – 200RFU cutoff
- Profiles reported as single source and major/minor or indistinguishable mixtures up to 3 contributors
  - >3 is inconclusive due to too many contributors
- Statistical calculations
  - RMP for single source and major profiles
  - CPI for indistinguishable mixtures
- General rules
  - >50% data (alleles) needed for inclusions
  - <50% data inconclusive due to insufficient information

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## Manual Interpretation

- ~2 months from initial testing to release of 37 reports
- ~1 additional month for release of 26 supplemental reports for additional suspect submissions
- 11 of the 38 suspects were associated to at least one case (RMP/CPI)
- 4 of the 11 positively associated suspects were connected to more than one case
- 30 evidence samples contained no or insufficient amount of DNA
- 30 profiles were reported as inconclusive due to too many contributors or insufficient information (some minor components also)

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## TrueAllele® Interpretation/Database

- Cuyahoga County Prosecutor's Office made aware of TA Databasing capabilities
- Probabilistic Genotyping using TrueAllele® Technology's Databasing Feature was done by Cybergenetics.
- .hid data files sent to Cybergenetics for TA analysis
- All profiles run through TA including those manually deemed inconclusive
  - Low data/3+ contributors
- Database Match Rules: *EVI-EVI, EVI-REF, REF-REF*

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## TrueAllele® Interpretation/Database

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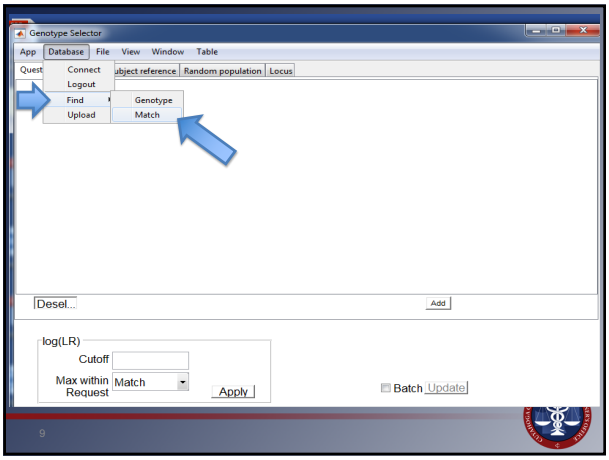


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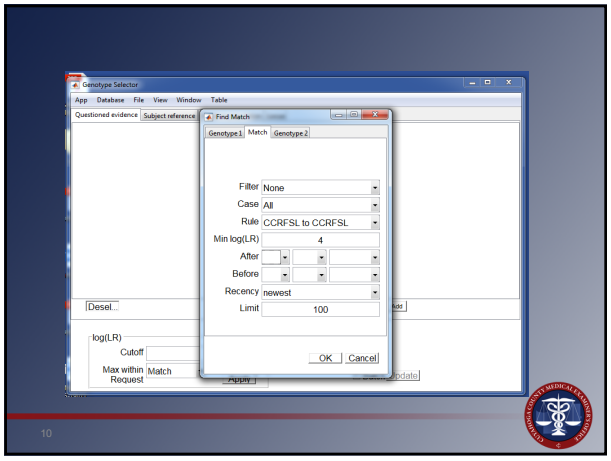
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Before
Recency newest
Limit 100
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log(LR)
Cutoff
Max within Request Match
Apply
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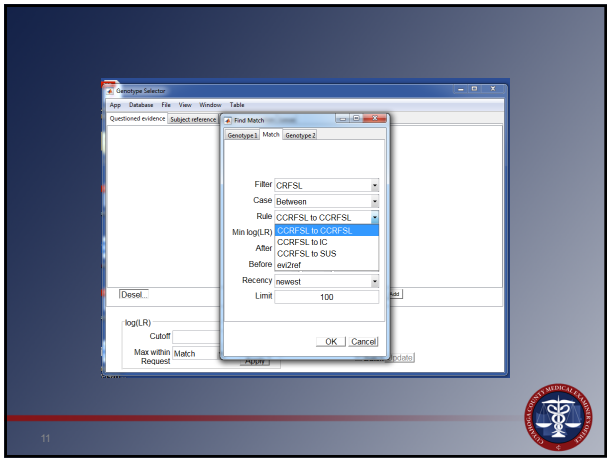
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Min log(LR) CCRFSL to CCRFSL
CCRFSL to IC
CCRFSL to SUS
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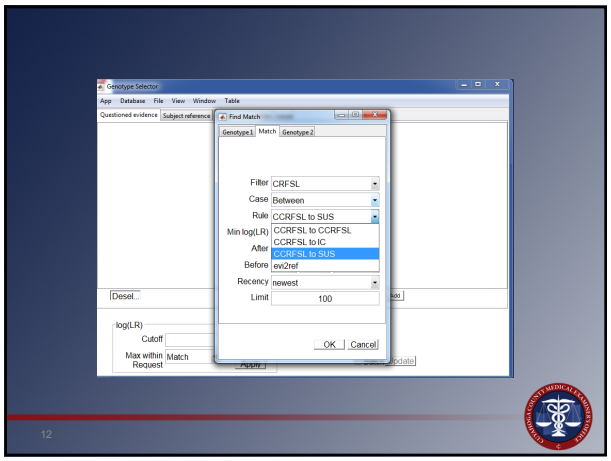
Before evi2ref
Recency newest
Limit 100
OK Cancel
Desel...
log(LR)
Cutoff
Max within Request Match
Apply
11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Limit 100
OK Cancel
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Apply
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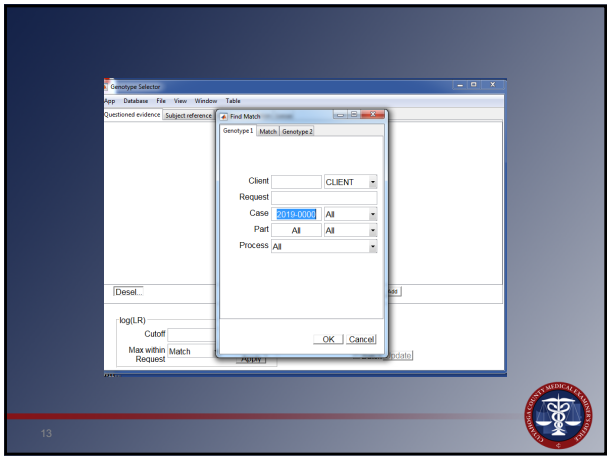
Genotype Selector
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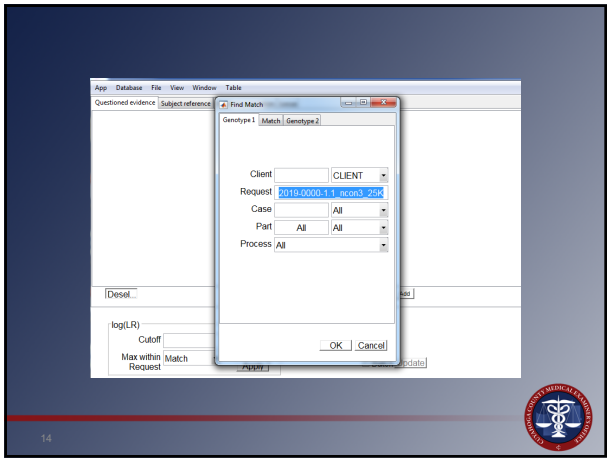
Find Match
Genotype 1 Match Genotype 2
Client CLIENT
Request
Case 2019-0000 All
Part All All
Process All
OK Cancel
Desel...
log(LR)
Cutoff
Max within Request Match
Apply
Update
13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Max within Request Match
Apply
Update
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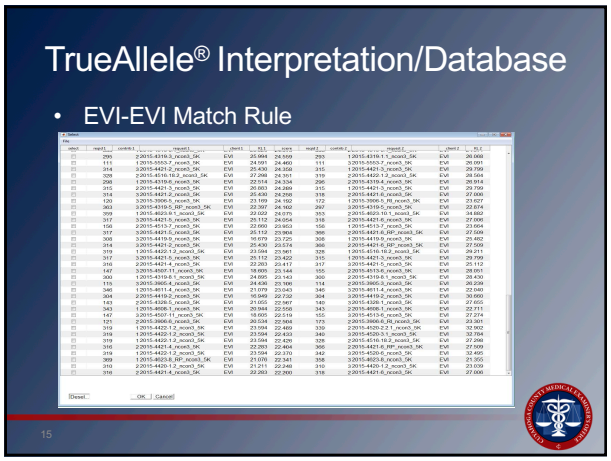
TrueAllele® Interpretation/Database
• EVI-EVI Match Rule
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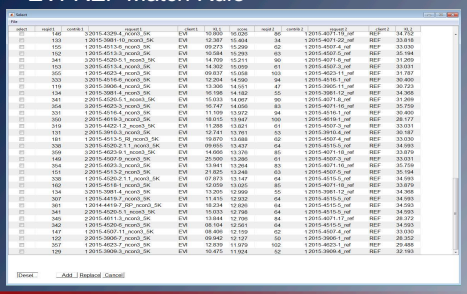
# TrueAllele® Interpretation/Database

- EVI-REF Match Rule



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# TrueAllele® Interpretation/Database

- EVI-REF Match Rule
- Link suspects to multiple cases
- Avoid direct comparison between reference and evidence profiles

| One suspect linked to eight cases | | |
|---|---|---|
| Case | Item | Log(LR) |
| 1 | Steering Wheel | 12.45 |
| 2 | Steering Wheel | 6.44 |
| 3 | Steering Wheel | 2.28 |
| 4 | Flashlight | 4.02 |
| | Steering Wheel | 16.04 |
| | Steering Wheel | 5.71 |
| 5 | Cigar | 6.36 |
| | Steering Wheel | 9.54 |
| 6 | Ignition Key | 2.33 |
| | Gear Shift | 5.99 |
| 7 | Gear Shift | 4.22 |
| | Driver Door Handle | 3.00 |
| | Pass. Door Handle | 4.55 |
| 8 | Cigar | 13.52 |
| | Cigarette Butt | 14.84 |
| | Ziploc Package | 10.32 |

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# TrueAllele® Interpretation/Database

- EVI-REF Match Rule
- Profiles not considered previously provide match information
- Manually interpreted profile was inconclusive due to >3 contributors
- Three linked suspects identified in the TA database

| Three linked suspects to above profile | | |
|---|---|---|
| Suspect | Item | Log(LR) |
| 1 | Gear Shift | 9.37 |
| 2 | Gear Shift | 8.00 |
| 3 | Gear Shift | 14.46 |

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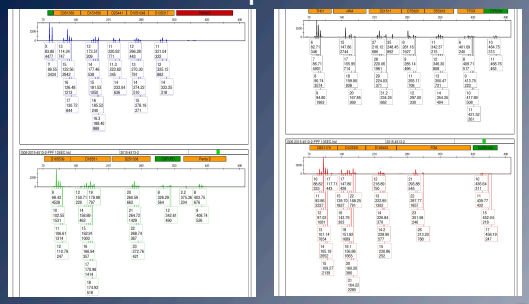
# TrueAllele® Interpretation/Database



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# The Summary

| Manual | TrueAllele |
|---|---|
| • ~2 month from testing to report release, additional month to release supplemental reports | • ~1 month from data upload/request to preliminary results |
| • 11 of 38 suspects associated to at least one case | • 16 of 38 suspects associated to at least one case |
| • 4 of the 11 suspects connected to multiple cases | • 8 of the 16 suspects connected to multiple cases |
| • 30 profiles reported as inconclusive | • All 30 profiles with at least one positive association |
| • 12 samples reported as exclusions | • Positive match scores for the 12 manual exclusions |

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# Acknowledgements

Work would not have been possible without the help and support of the members of the Cybergenetics team:

Bill P. Allen, MS
Jennifer M. Hornyak, MS
Dr. Mark W. Perlin, PhD, MD, PhD
Matthew Legler

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## Thank You!

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