TrueAllele in Virginia

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DNA Mixtures in Virginia prior to 2010

• Ran gels (FMBIO) for many years
• Capillary electrophoresis in 2008

Mixture statistics
• Likelihood ratio
• Combined probability of inclusion (CPI)
SWGDAM 2010 interpretation guidelines

• CPI on data above stochastic thresholds

• Does mention probabilistic modeling as a possible approach
TrueAllele (TA)

- Began to research probabilistic modeling
- Sent Cybergenetics known mixtures and evaluated their software
- Started a 2 part validation study fall 2011
TrueAllele Validation
Part 1

• Validation at Cybergenetics
  – mixtures from forensic cases
  – A TrueAllele report would be issued which would be used in Virginia courts
True Allele Validation
Part 2

• Conducted at DFS
• DFS Staff, DFS server and known mixture samples
• Publication *Establishing the Limits of TrueAllele® Casework: A Validation Study*
  JFS
VDFS Validation Study

- Used mock casework samples which included the following:
  - 17 single source profiles (degraded and stochastic)
  - 18 two person mixtures
  - 14 three person mixtures
  - 7 four person mixtures
Tested using TrueAllele® Casework (TA):

– Single source samples
  • With allelic and locus drop-out

– Reproducibility of the process

– Accuracy of the TA process
  • Exclusion of non-contributors
  • Inclusion of true contributors
  • Mixture weight assessment for two-person mixtures

– Sensitivity of the TA process
  • Minor contributor contribution level below which results in negative log likelihood ratio \{\log(LR)\}

– Specificity of the TA process
  • Elimination of non-contributors
  • Elimination of relatives of the contributors
Specificity - Largest log (LR) values obtained

Compared mixtures against 100 reference profiles

A total of 21,400 comparisons made

One non-reproducible positive match statistic

2.9X more likely
Training of Staff at DFS

• 4 examiners in house
• Participated in validation work
• Completed Operator training courses taught by Cybergenetics.
• Observed TrueAllele testimony in Virginia
DNA testing in Virginia

- 4 laboratories
- 55 DNA examiners
- 4 DNA examiners qualified in TrueAllele
  - Online Jan 2014
  - Richmond Laboratory
  - TA Server located in Richmond
DNA testing in Virginia

- Use TA in violent cases in crimes against a person
- Use on 2 and 3 person mixtures
- Will try and generate a “traditional” statistic on the mixture first
- If the traditional statistic cannot be calculated case transferred to the TA team
DNA testing in Virginia

• 3 person mixture in a homicide
• Examiner and technical reviewer agree a subject person could be a possible contributor
• Report “conclusions and statistical estimates regarding item ______ will be the subject of a separate report”
• Forward to the TA team for a separate report
TA cases in Virginia

- Approximately 130 cases
- State, federal and military courts
- Approximately 20 court testimonies
- 1 admissibility hearing
  - State court
  - Homicide case
  - Week long
TA processing

• How long does it take
  – Simple single source reference samples minutes
  – 3 complex person mixtures several days of processor time
TA lessons learned

• Belt and suspenders approach
• A lot of data to review
• Depending on the mixture may not be a fast process
• Does not always provide a rare match statistic
• Will lead to more eliminations
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