

DNA Identification: Mixture Interpretation

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Cybergenetics

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Fingernail DNA Evidence



93.3% victim + 6.7% DNA component

DNA Evidence

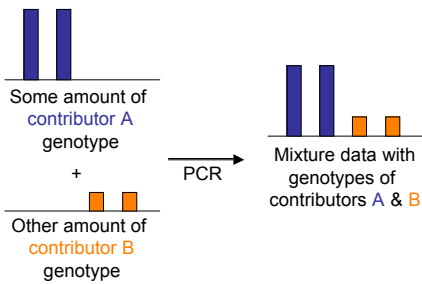
- DNA from under victim's fingernails (Q83)
- two contributors to DNA mixture
- 93.3% victim & 6.7% unknown
- 1,000 pg DNA in 25 ul
- STR analysis with ProfilerPlus®, Cofiler®
- know victim contributor genotype (K53)
- TrueAllele® computer interpretation (using genotype addition method)
infer unknown contributor genotype
- only after having inferred unknown, compare with suspect genotype (K2)

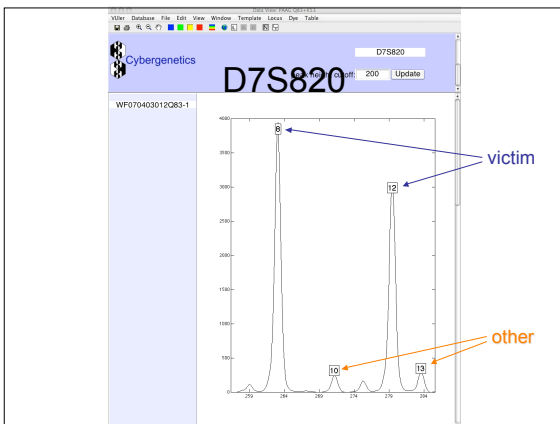
Three DNA Match Statistics

Score	Method
13 thousand	inclusion
23 million	subtraction
189 billion	addition

- Why are there different match results?
- How do mixture interpretation methods differ?
- What results should be presented in court?

DNA Mixture Data





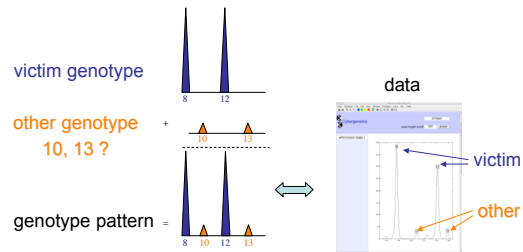
Quantitative Mixture Interpretation

Step 1: infer genotype

- consider every possible allele pair
- compare pattern with DNA data
- Rule: *better fit's more likely it*



Quantitative Genotype



Quantitative Information

At the suspect's genotype,
identification vs. coincidence?

$$\begin{array}{l}
 \text{after} \\
 \text{(evidence)} \\
 \uparrow \text{data} \\
 \text{before} \\
 \text{(population)}
 \end{array}
 \begin{array}{l}
 \text{Prob}(\text{suspect matches evidence}) \\
 \text{Prob}(\text{suspect matches population}) \\
 \\
 \\
 \end{array}
 = \frac{100\%}{1.72\%} \\
 = 58$$

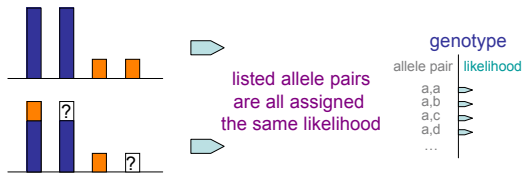
Step 2: match genotype

high probability retains LR information

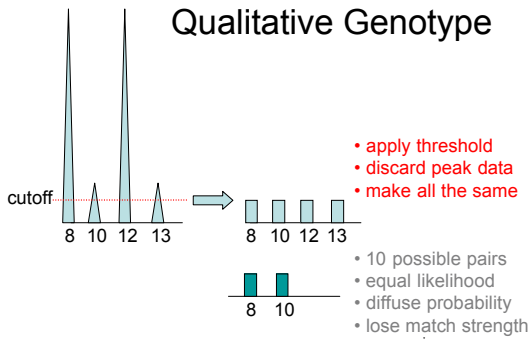
Qualitative Manual Review

Step 1: infer genotype

Rule: every pair gets equal share

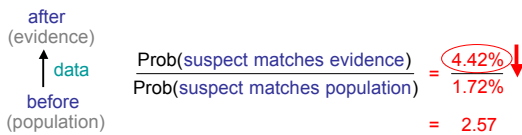


Qualitative Genotype



Qualitative Information

At the suspect's genotype,
identification vs. coincidence?



Step 2: match genotype

lower probability loses LR information

