

**More informative DNA identification:
Computer reinterpretation of
existing data**

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Midwestern Association of Forensic
Scientists 39th Annual Meeting
October, 2010



Cybergenetics

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SWGAM

2010 SWGDAM guidelines, section 3.2.2

If a stochastic threshold based on peak height is not used in the evaluation of DNA typing results, the laboratory must establish alternative criteria (e.g., quantitation values or use of a **probabilistic genotype** approach) for addressing potential stochastic amplification. The criteria must be supported by empirical data and internal validation and must be documented in the standard operating procedures.

TrueAllele® Casework

Computer interpretation of DNA evidence
by mathematically modeling STR process

Primary goals

- objectivity
- ease of use
- information
- productivity

Interpretation Matters

National Institute of Standards and Technology
Two Contributor Mixture Data, Known Victim

LabID	Kits Used	Cases		
		Caucasians	African Americans	Hispanics
30	ProPlus/Collier	1.18E+15	2.13E+14	3.09E+15
34	ProPlus/Collier	2.40E+11	2.64E+07	9.00E+10
33	ProPlus/Collier	2.94E+08	1.12E+08	1.74E+09
6	ProPlus/Collier	40,000,000	3,500,000	260,000,000
9	ProPlus/Collier	1.14E+07	1.97E+07	1.54E+08
79	ProPlus/Collier	930,000	47,000	1,350,000
16	ProPlus/Collier	434,600	31,710	399,100

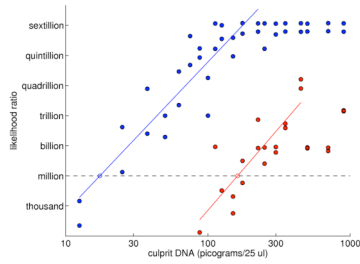
213 trillion (14)

31 thousand (4)

Remember that these labs are interpreting the same MIX05 electropherograms

Preserving DNA Information

Quantitative vs. Qualitative



Data Classification

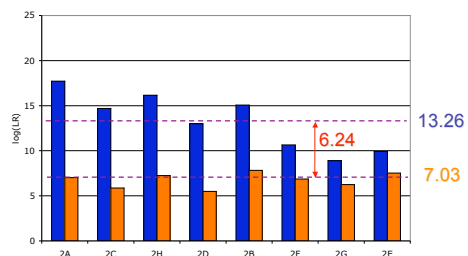
Mixture items assigned a degree of difficulty

Simple: two person mixture with a known victim

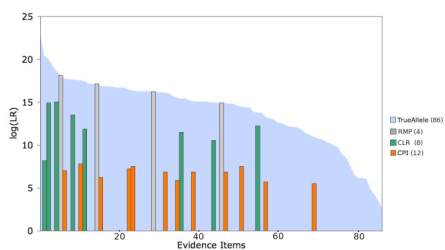
Medium: two unknown mixture samples

Complex: three or more unknown contributors, or a partial profile

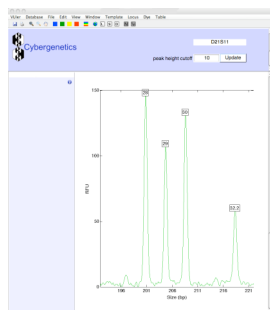
Information - *two unknown*



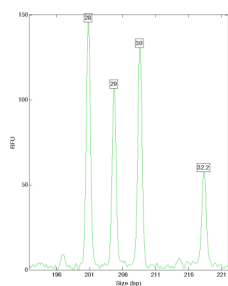
Information - *all mixtures*



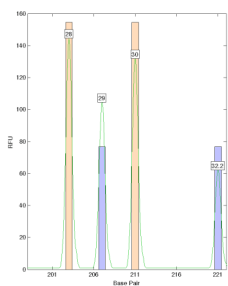
Locus D21S11



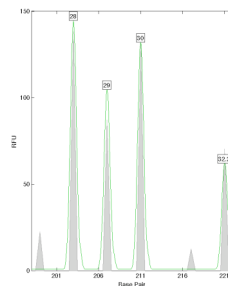
Quantitative TrueAllele



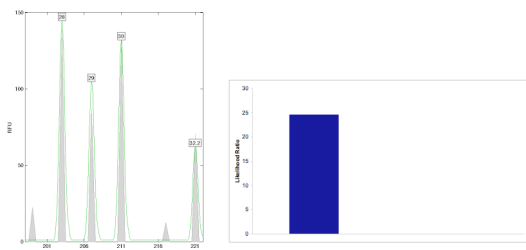
Quantitative TrueAllele



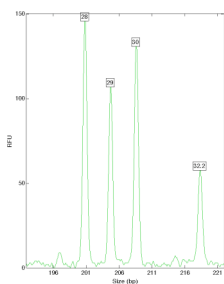
Quantitative TrueAllele



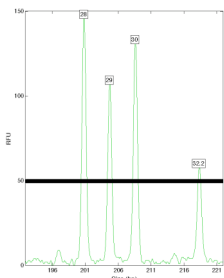
Quantitative TrueAllele



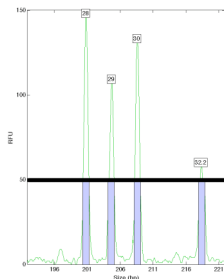
Qualitative Threshold



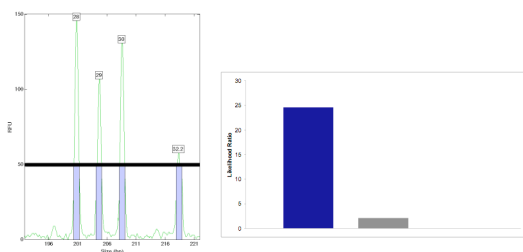
Qualitative Threshold



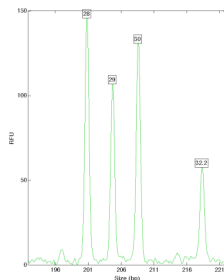
Qualitative Threshold



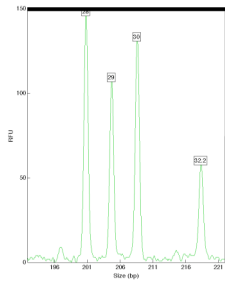
Qualitative Threshold



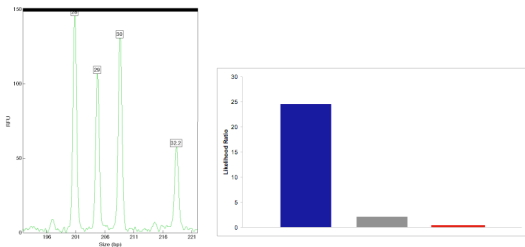
Stochastic Threshold



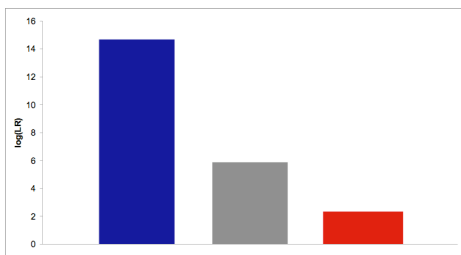
Stochastic Threshold



Stochastic Threshold



13 Locus Statistic



Conclusion

- Forensic analysts' goal is to get identification information from their data to help solve cases
- SWGDAM guidelines make it more difficult for analysts to extract information from DNA data
- TrueAllele's approach of probabilistic interpretation is allowed by the SWGDAM guidelines and extracts more identification information than human interpretation
- Using a probabilistic genotype interpretation would enable forensic analysts to better ensure public safety

Acknowledgements

Cybergenetics
William Allan
Meredith Clarke
Matthew Legler
Jessica Smith
Cara Spencer

New York State Police
Barry Duceman
Melissa Lee
Shannon Morris
Elizabeth Staude

Northeast Regional
Forensics Institute
Jamie Belrose



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