When Good DNA Goes Bad

International Conference on Forensic Research & Technology
October, 2012
Chicago, Illinois

Mark W Perlin, PhD, MD, PhD
Cybergenetics, Pittsburgh, PA

DNA mixture evidence

The Washington Post
Virginia reevaluates DNA evidence in 375 cases
July 16, 2011

“Mixture cases are their own little nightmare,” says William Vosburgh, director of the D.C. police’s crime lab. “It gets really tricky in a hurry.”

“If you show 10 colleagues a mixture, you will probably end up with 10 different answers”
Dr. Peter Gill, Human Identification E-Symposium, 2005

A person's genotype

A genetic locus has two DNA sentences, one from each parent.

An allele is the number of repeated words.

A genotype at a locus is a pair of alleles. 8, 9

Many alleles allow for many many allele pairs. A person's genotype is relatively unique.
Good DNA evidence data

Misinterpreted, data goes bad
TrueAllele solves mixtures

First contributor
Second contributor
Third contributor
Objective & thorough; DNA match statistic

Commonwealth v. Lyons
Location: Eastern United States
Crime: Murder
Evidence: Sweatshirt
True information: 12
Human guess: 4
Reason: Degraded mixture
Outcome: Death penalty

Commonwealth v. Foley
Location: Eastern United States
Crime: Murder
Evidence: Victim's fingernails
True information: 11
Human guess: 4
Reason: Minor 7% DNA mixture
Outcome: Life in prison

The Queen v. Shivers
Location: Northern Ireland
Crime: Murder, terror
Evidence: Mobile phone
True information: 9
Human guess: 0 (inconclusive)
Reason: Low DNA amount
Outcome: 25 years in prison

State v. Diggins
Location: Southern United States
Crime: Rape
Evidence: Tampon string
True information: 4
Human guess: 0 (inconclusive)
Reason: Low DNA amount
Outcome: Still serving life sentence

Commonwealth v. Doe
Location: Eastern United States
Crime: Rape
Evidence: Glove
True information: 0
Human guess: 2
Reason: Three person mixture
Outcome: Charges were dropped
Quantitative interpretation: accurately excludes

Human misinterpretation can falsely implicate

Computer reinterpretation, charges were dropped

<table>
<thead>
<tr>
<th>information</th>
<th>human</th>
<th>computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>suspect</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>other</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>victim</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
Commonwealth v. Brown
Location: Eastern United States
Crime: Rape
Evidence: Underwear
True information: 0
Human guess: 3
Reason: Y-STR not relevant
Outcome: DNA ruled inadmissible

State v. Smith
Location: Western United States
Crime: Assault with weapon
Evidence: Gun
True information: 0 (inconclusive)
Human guess: 0
Reason: Mixture
Outcome: Still in prison

DNA database exoneration?
Post-conviction test
Information < 0

The right person?
Information ~ 9

10 million offenders
Can’t use CODIS – Good data gone bad
TrueAllele v. People

- Good DNA data can make identifications
- Computer can determine true information
- Human review does not always correlate
- And then, good DNA data goes bad

More information

http://www.cybgen.com/information
- Courses
- Newsletters
- Newsroom
- Presentations
- Publications

perlin@cybgen.com