

Making Something Out of Nothing: the “Inconclusive” Fallacy

American Academy of Forensic Sciences
Jurisprudence Section
February, 2022
Seattle, WA

Kelley Kulick¹, JD; Mark Perlin², PhD, MD, PhD

¹Santa Clara County Public Defender, California

²Cybergenetics Corp, Pennsylvania



Cybergenetics

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Nothing comes of nothing

"You can't get something for nothing"
– First Law of Thermodynamics

" $0 + 0 = 0$ "
– Peano Postulates of Natural Numbers

"Nothing will come of nothing"
– King Lear, Act I, William Shakespeare

No evidence implies guilt?

Some lawyers argue:

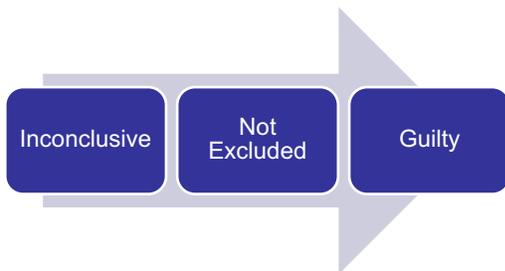
1. Absence of forensic evidence implies guilt.
2. “Inconclusive” DNA evidence means the defendant is included in the DNA evidence.

Fallacious, wrong & dangerous!

Inconclusive, so not excluded...

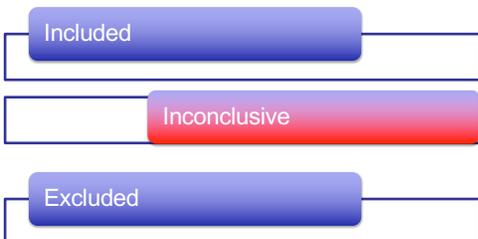
- “Due to the potential number of contributors and low-level results, **no conclusions** will be made regarding this DNA profile.”
- “Due to the limited amount of information obtained, the comparison between defendant and this DNA mixture is **inconclusive**.”

Defendant must be included!



Must “include” or “exclude”?

Misapplication of The Law of the Excluded Middle



Information from DNA evidence

Hypothesis: Defendant is **included** in DNA
Alternative: Defendant is **excluded** from DNA

Evidence support for **included** hypothesis  Evidence support for **excluded** alternative

Data support for "included" and "excluded" are equal
likelihood ratio (LR) equals one

Zero stat, zero information

logarithm of LR measures information

likelihood ratio (LR) equals one
 $\log(\text{one})$ equals zero
evidence has zero information

There is **zero information** about inclusion or exclusion.

Zero is **NOT a positive $\log(\text{LR})$** supporting **inclusion**.
Zero is **NOT a negative $\log(\text{LR})$** supporting **exclusion**.

A **zero $\log(\text{LR})$** means **zero information**.

Informative DNA goes unreported

Many crime labs apply thresholds to LR values.

Inclusionary LR of 1000  **Inconclusive**
Exclusionary LR of 1 in 1000  **Inconclusive**

Discarding scientific information
opens the door for legal mischief.

Error rates enable reporting

Report an error rate that provides a frequency context*

"What's the chance that someone
who didn't leave their DNA
would have a match statistic as strong?"

Error rates help prevent the unscientific transformation
of informative DNA evidence into inconclusive results.

* Perlin, M.W. *Heliyon*, 4(10):e00824, 2018.
Efficient construction of match strength distributions
for uncertain multi-locus genotypes

"Inconclusive" isn't admissible

- FRE Rule 401 – Evidence is relevant if:
 - a) it has any tendency to make a fact more or less probable than it would be without the evidence; and
 - b) the fact is of consequence in determining the action.
- FRE Rule 403 – The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.

"Inconclusive" fallacy





Criminal Cases

Ethical implications

- *General Electric Company v. Joiner*
(1997) 522 U.S. 136
- *Kumho Tire Company, Ltd. v. Carmichael*
(1999) 526 US 137

How to counter the fallacy

- Motions to exclude the presentation of inconclusive results (FRE 401, 403, 702)
- Motions to limit expert testimony
- Presentation of expert testimony to counter fallacy and/or admit LR's with error rates
- Motions to preclude fallacious arguments during closings

Conclusions

- Nothing comes of nothing
- Zero information means zero evidence
- Trying to make something from nothing
- No scientific basis for argument
- Always report DNA match statistics
- “Inconclusive” evidence is inadmissible
- Better science leads to better justice

Counter the “inconclusive” fallacy
