F29   On The Threshold of Injustice: Manipulating DNA Evidence

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After attending this presentation, attendees will understand how DNA evidence can be manipulated by adjusting thresholds and other subjective data interventions.

This presentation will impact the forensic science and criminal justice communities by illustrating how DNA data can be subtly adjusted to achieve a biased result. In the provided case example, exclusionary evidence was used to produce an inclusionary match statistic.

Fingernail DNA evidence was obtained from a homicide victim. Short Random Report (STR) laboratory analysis revealed a possible DNA mixture containing the victim's DNA, and perhaps a second person's. Working for the prosecution, an operator used his probabilistic genotyping software program to compare this possible mixture with that of a defendant.

Reliability Rule 702 of the Federal Rules of Evidence (FRE) for the admissibility of expert testimony requires sufficient data, a reliable method, and that the method be reliably applied to the data.

Sufficient Data: The fingernail data contained potentially exculpatory DNA peaks between 30rfu and 50rfu that did not come from the defendant. According to the software, the mixture ratio was approximately 250:1.

Reliable Method: The software's validation studies have been published using a data threshold of 30rfu. None of these studies used a 50rfu threshold that discards more DNA peaks.

The software's validation studies have decreased to a mixture ratio of 25:1. No published studies have examined ratios as low as 250:1, the level of a few cells.

At a ratio of 250:1, the minor contributor may be too low to detect. Studies by the developer determine that the software is unreliable at this level. The program cannot accurately distinguish between true and false matches. It can give a positive association, whether or not a person's DNA is actually present in the mixture.

Reliably Applying Method to Data: The expert operator found a 250:1 mixture ratio. Such a tiny purported minor component may not even be from a real person. The software was only validated for 25:1 mixtures, not for a 250:1 ratio. Applying an unreliable method to insufficient data is not reliable.

The operator chose a threshold of 50rfu, but the fingernail evidence contained potentially exculpatory evidence between 30rfu and 50rfu and the software was validated for using more peaks at 30rfu, not fewer at the higher 50rfu level. Applying an unreliable method to insufficient data is not reliable. In fact, running the software at a validated 30rfu threshold would exclude the defendant. The fingernail evidence was exculpatory. The software proves that the defendant's DNA was not present.

A software operator can subjectively choose his/her data to obtain the answer he/she wants. Running the validated software program on all the relevant data excludes the defendant, and helps prove his innocence. The operator's invalid data choices provide a scientifically baseless answer that could lead prosecutors to a wrongful conviction.

Relevance Rule 403 balances the probative value of evidence against its prejudicial nature.

Probative: Ignoring crucial exculpatory evidence (i.e., data peaks between 30rfu and 50rfu) does not prove anything. Running an unreliable computer program (i.e., unvalidated at 50rfu or for 250:1 mixture ratios) does not prove anything. The prosecution's expert ran an unreliable method on insufficient data to report a non-scientific result. When there is no science behind an expert's opinion, it has no probative value.

Prejudicial: DNA is highly prejudicial evidence. Telling a juror that DNA connects important evidence to a defendant strongly conveys guilt. If that DNA connection is wrong, no amount of good science to the contrary can "unring" the bell. The jury should not hear flawed DNA evidence that can unfairly harm a defendant and irreversibly taint a trial.

Prosecutors can present DNA to jurors as infallible evidence, but expertly manipulating the data can alter its interpretation and provide subjective or inaccurate results. Most statistical DNA software allows the user to choose their data. This case study illustrates the danger of such practices.

DNA Evidence, Biased Statistics, Admissibility

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