F25 Errors in DNA Testing: Lessons Learned — A Retrospective Look

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After attending this presentation, attendees will understand: (1) some of the limitations of DNA testing; (2) what types of errors may occur during DNA testing; (3) more about the detection, prevention, and remediation of errors in DNA testing; and, (4) current issues in testing and interpretation of DNA samples with small amounts of DNA and/or mixtures of DNA from three or more contributors.

This presentation will impact the forensic science community by providing information regarding the types of errors that may be encountered in forensic DNA testing, some of which could lead to misinterpretations of the data with false inclusions or false exclusions of known individuals.

There are errors inherent to all test systems and DNA testing is no exception. Since its introduction to the forensic science community almost 30 years ago, a great deal has been learned about the limitations and errors of DNA testing. It is true that there is a minimal chance of errors in testing and interpretation if evidence collection and handling are correctly performed, properly validated laboratory procedures are duly followed with appropriate controls being used and monitored, and analysts are well trained in the technical procedures and in the interpretation and reporting of the data. The types of errors that can occur in DNA testing, including human errors and errors related to limitations of the technology, will be discussed. Information regarding which type of errors may be detected and how they may be identified will be provided. Possible preventative steps and remediation activities will also be presented.

Examples of current problems in DNA testing of biological samples resulting from the dramatic influx of evidence items seized from property crime scenes will be provided. Stochastic effects that commonly occur when polymerase chain reaction technology is used for the amplification of small amounts of DNA, termed low template DNA, can result in DNA profiles that are not reproducible and do not reflect the DNA profile of the true contributor of the DNA sample. Many of these samples are complex mixtures of DNA from three or more contributors, some of whom may be related. Testing and interpretation issues resulting from these types of samples will be discussed, including the possibility of the reporting of false inclusions and exclusions of individuals and the difficulty in providing reasonable statistical frequency estimates.

It is important for the forensic science community to recognize and acknowledge the types of errors that can occur during testing. It is critical that a culture is developed and promoted where the detection and correction of mistakes is strongly encouraged and perhaps even rewarded. Laboratory management and analysts should be forthcoming regarding any errors made and any limitations to a test system to prevent a miscarriage of justice. The identification and acknowledgement of mistakes and errors provide a noteworthy opportunity for additional corrective training and for the introduction of preventative measures and improved procedures aimed at generating the best, most reliable, and defensible testing results possible.

Errors, DNA, False Results