B2 Stay Gold: Lab-Based Considerations to Help Keep Forensic DNA Analysis the Shining Standard

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Learning Overview: The goal of this presentation is to discuss optimal approaches to biological evidence examination and sampling through the use of several illustrative case examples.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating ways in which a DNA analyst can expand evidence sampling techniques to produce test results that more accurately reflect the nature and amount of biological material present in the parent specimen.

DNA analysis has long been considered the gold standard of forensic science. Since the late 1980s, advances in Polymerase Chain Reaction (PCR) - based DNA technology have allowed analysts to derive more genetic information from progressively smaller amounts of biological material in less time. Today, nearly every step of the forensic DNA analysis process can be automated.

Some of the decisions most critical to successful DNA testing are made at the very beginning stages of the process: biological screening and sampling. For most of the myriad of physical evidence specimens one might encounter in a case, it is not feasible to automate these procedures. So, it is essential the procedures available to and the skills possessed by every forensic biologist are optimized for the best possible investigative outcome.

Several actual case examples will be presented to illustrate this approach. In the laboratory, a frequent request is to re-examine and re-test aged and/or minimal evidence specimens in numerous active and post-conviction cases, usually after another laboratory has been unsuccessful. This often requires the scientist to think “outside the box” and expand both the specimen type and sampling approach in order to glean sufficient biology to produce a meaningful DNA test result.

As an example, in a postconviction sexual assault case, a defendant was convicted solely based on eyewitness testimony. Examination of the victim’s underwear in 1987 revealed the presence of semen, but no DNA testing was performed at the time. Fifteen years later, the victim’s underwear was sent to another laboratory that concluded that no semen was present on the item. Nearly another 15 years later, the underwear was re-examined and, this time, semen was detected. The subsequent DNA testing result confirmed the convicted defendant as the semen source.

Each of the cases presented will reveal the value of specimen-specific examination and sampling techniques that not only produced dispositive results but also significantly higher amounts and quality of DNA from previously examined and sampled evidence. This evidence includes firearms and sexual assault specimens. In each case, this presentation will also explore the likely reasons why initial DNA testing was not successful.

These examination and sampling approaches are equally applicable to current, backlogged, cold, and post-conviction evidence testing. The results in these cases have benefitted both the prosecution and defense; some have reaffirmed the identity of a convicted suspect and others have resulted in the exoneration of innocents, but the overarching benefactor is justice. These cases will demonstrate that while forensic scientists must operate within a prescribed set of standard procedures, some of the most crucial decision-making in the DNA testing process must be autonomous.

DNA, Evidence Examination, Sampling

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