B147 Increasing DNA Typing Success With Improved Front-End Processing and Alternate Workflow Strategies

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After attending this presentation, attendees will understand that there are a number of alternatives from swab selection to designed workflow to consider in order to improve sample recovery and extracted DNA yield, as well as to minimize sample consumption. The outcome can be increased success, improved processes, and maintaining as much sample as possible for additional testing.

This presentation will impact the forensic science community by stressing the importance of collection and extraction and how these processes, if considered in a systems approach, can benefit developing investigative leads in a cost-beneficial manner. Indeed, it is these processes that contribute substantially to the success of DNA typing, especially for low-quantity samples. This presentation will describe the important features to consider to affect an efficient process of DNA recovery and reduced consumption of biological evidence.

Consumption of evidence is a critical concern in forensic DNA analyses, especially for challenged samples that contain low quantity and/or degraded DNA. Success of DNA typing is related to the amount of target material recovered from an evidentiary item. Collecting as much sample as possible, maintaining the integrity of the sample after collection, and recovering as much DNA as possible should be sought. In addition, there have been arguments in legal proceedings that samples should be split, regardless of whether there is potentially ample material or if there are only minute quantities. Sample splitting for low-quantity samples can translate into no or inconclusive results in some cases in which consuming the entire sample may have generated an interpretable result.

A better way to address increasing typing success and concomitantly minimize sample consumption is to consider novel methodologies or tools and alternate workflows. These approaches should improve sample collection by using effective collection devices (such as nylon flocked devices), by utilizing tools that release DNA well during extraction to obtain the highest yield possible (such as specialized extraction baskets), and can subsample evidence to minimize sample consumption (such as micro-sized collection systems). The issues surrounding legal arguments on sample consumption and workflows using newly developed swabs and extraction baskets will be described. The subsampling method consumes such a small portion of the stain that essentially the entire sample is preserved for additional testing or re-analysis. After collection, the sample is amplified directly. Under the amplification conditions, there appears to be an enhanced sensitivity of detection likely due to a localized Polymerase Chain Reaction (PCR) effect even at 1:99 dilutions of blood and saliva based on higher Short Tandem Repeat (STR) peak heights than standard procedures with 1ng input DNA from the same samples. Touch samples from common items and textiles yielded results consistent with the types of the donors and items. The results of this study may potentially have important implications for analysis of low quantity and/or degraded samples that plague forensic casework.

Swab, Extraction, Sampling Strategy