A45 Optimization of Touch DNA Collection

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After attending this presentation, attendees will understand the importance of testing for trace DNA in a crime laboratory by observing the number of successful touch DNA cases for the Texas Department of Public Safety Houston Crime Laboratory. Attendees will also learn the best liquid for recovering touch DNA using the double swab technique.

This presentation will impact the forensic science community by introducing the number of Combined DNA Index System (CODIS) hits for touch DNA at the Texas Department of Public Safety Houston Crime Laboratory since 2007 and by presenting an optimal method of recovering touch DNA.

The Texas Department of Public Safety Houston Crime Laboratory considers touch DNA, also known as trace DNA, to be any DNA deposited through touch. This does not include DNA from blood, saliva, or tissue. Approximately 19% of the crime laboratory's property crimes including robbery, burglary, theft, and auto theft cases have resulted in CODIS hits from touch DNA evidence alone; this study spanned from 2007 to present cases. Most laboratories, including some in the Department of Public Safety system, do not collect touch DNA from evidence. This percentage indicates an importance for the collection of touch DNA and how often it succeeds. To improve this number, several touch DNA collection methods were analyzed and the best one selected. The Texas Department of Public Safety Houston Crime Laboratory currently uses deionized (DI) water and a single swab method to obtain trace DNA from evidence. Pang and Cheung (2007) have suggested the use of a double swab method, which utilizes one wet swab followed by a dry swab to collect the DNA. The wet swab collects a portion of the DNA but also leaves a residue behind for the dry swab to collect. The two swabs are then extracted together. The method has been found to collect more DNA than the single swab method. Therefore, this technique was utilized; however, the wet swab was composed of varying liquids other than just DI water.

Three different liquids were selected for testing, and these included DI water, sodium dodecyl sulfate (SDS), and SDS:isopropanol:deionized water. DI water acted as the control since the laboratory already uses this method. In a previous study, SDS was determined to be an optimal detergent for DNA collection; based on its hydrophobic properties and DNA properties such a detergent attracts DNA. In addition to the DI water and SDS, a combination of SDS, isopropanol, and DI water was also utilized. According to a previous study, isopropanol yields more DNA due to its lack of surface tension. With the lack of surface tension from the isopropanol, the liquid will disperse more evenly covering more surface area, and with the high attraction from SDS, the liquid will also collect more DNA. Additionally, isopropanol dries quickly, creating an almost instant collection time. Isopropanol has also been found to preserve DNA from bacterial degradation. For the experiment, DNA was deposited on four different surfaces: a steering wheel, a laboratory coat collar, a revolver, and a hard hat. Using the double swab technique and the three different liquids, the DNA was collected.

The swabs were extracted according to the Qiagen Standard Operating Procedure (the most popular method at Department of Public Safety Houston, TX). Quantitation, amplification, and analysis were also performed according to the Department of Public Safety Houston, TX

Standard Operating Procedures. The profiles were compared to known profiles for a better analysis. The interpretation of results was based on the quantity of DNA yielded as well as the profile produced. Although some samples did not result in quantification, DI water yielded the most DNA for the other samples. SDS produced a substantial profile with little to no peak height imbalance. Further testing should be performed in order to better the conclusions.

Touch DNA, Trace DNA, DNA Collection

