E73 Rapid Detection of Saliva Presence Using the Phadebas Press Test: A Comparative Study of Three Common Bra Materials and Sealed Envelopes

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After attending this presentation, attendees will be provided with a summary of practical difficulties encountered and tips acquired for the presumptive screening of saliva presence for subsequent DNA analysis.

This presentation will impact the forensic science community by drawing attention to a time-and cost-saving technique that is simple enough to be used in-field (or to be included in sexual assault kits) and has the ability to at least exclude evidence that crime scene technicians should not submit for DNA analysis.

Sexual assaults in the media are not uncommon headline news. Prior to the current era of DNA profiling, forensic science often, as in the prosecution of the infamous serial rapist Ted Bundy, relied upon the now heavily criticized discipline of bitemark analysis; however, even today, quite often the criticism expressed is the lag time or delay in the processing of DNA evidence as it is assumed there is an abundant presence of suitable semen and/or saliva samples in sexual assaults. This is often exasperated by the "CSI effect" or the layperson's expectation of DNA being able to quickly solve any crime just like on television.

Several serious challenges to DNA still remain unanswered: (1) the victim feels so violated she first takes a long shower to cleanse herself and washes away suitable DNA evidence from her body before contacting police; (2) unlike semen, even if saliva is deposited on the victim's clothing during biting or drooling, actually finding the saliva using varied light sources is not only notorious for a high frequency of false positives (which lack the epithelial cells needed for generating DNA profiles), but also adds to the workload and delays both the lab analyst as well as the victim and society; and, (3) a need exists for validating a faster, more accurate presumptive test for saliva deposition in the context of real-world evidence, such as on a bra after a rapist bites a victim's breasts or on a sealed envelope after a white collar criminal mails a letter. In this empirical study, the use of blue dye-linked starch paper (Phadebas Press Test) to detect the presence of amylase activity as the result of saliva deposition after biting was tested on worn bras containing three common types of carrier materials: 90% polyester/10% spandex (main body); 100% polyurethane (foam padding); and 100% polyester (backing). The paper's ability to detect saliva deposited on gum arabic (envelope glue) from sealed envelopes, a common type of evidence encountered in blackmail and white collar-based crimes, was tested.

With both the bras as well as envelopes, the approximate locations of all saliva deposited were documented prior to later testing for the determination of false negatives. Likewise, the areas that were known to be saliva-free served as a control to safeguard against false positives. To account for the possibility of false positives specifically as it relates to the practice of sealing envelopes with water instead of saliva, envelopes sealed with water were tested as well. For added realism due to the inherent gap between saliva deposition and evidence collection, all experimental evidence was left to sit at 25˚C (room temperature) for a period of three days. Since the "press-and-spray water" test was successful in providing the white-to-blue color change indicative of the approximate saliva spot in all instances, it was concluded that the above conditions are suitable for amylase activity to be observed.

Subsequent Polymerase Chain Reaction (PCR) reactions yielded complete DNA profiles from the original samples in the majority of detected stains. Of the original samples that failed to generate complete DNA profiles, nearly all generated profiles when the corresponding Phadebas paper was used for PCR. Preliminary findings

suggest the amylase-starch-dye reaction has little to no effect on PCR chemistry. Thus, dye-linked starch paper press tests are useful as a time-and cost-saving measure since this presumptive and potentially simple-enough-to-be-used-in-field (or to be included in sexual assault kits) test has the ability to at least exclude evidence that crime scene technicians should not submit for DNA analysis. Finally, a summary of practical difficulties encountered and tips acquired during these experiments and suggestions for a more detailed protocol for future use will be provided.

Sexual Assault, DNA, Presumptive Screening