

Comparison of DNA typing success in compromised blood and touch samples based on sampling swab composition.

After attending this presentation, attendees will understand the impact of time and temperature on DNA analysis of samples using both cotton and a proprietary swab designed to minimize degradation of forensic samples.

This presentation will impact the forensic science community by providing an opportunity to evaluate a novel sampling product for forensic DNA evidence, and promote more research and awareness of preventing DNA degradation at sampling and during storage.

Sample collection at the crime scene can introduce variations in DNA recovery, both based upon the substrate or material used as well as the storage conditions after collection. Both the substrate and the body fluid deposited on the evidence can harbor microbial populations, which can be co-collected onto the swab and degrade the sample even during drying and storage, and before DNA extraction can be performed. The purpose of this study was to evaluate and compare standard cotton swab collection with the Bode Biosafe® swab, which includes both a desiccant at the swab head as well as proprietary bacteriostatic compounds included to prevent degradation of the sample.

Venous blood samples were collected from 5 donors into sodium heparin tubes, and contact samples from 10 donors were deposited onto both porous (cotton fabric for both blood and touch) and non-porous (linoleum flooring and computer keyboards, respectively) surfaces and allowed to dry. The samples were then swabbed with a standard cotton swab or the Biosafe swab and stored at room temperature, 37°C or 55°C for 30, 90 or 180 days. After the elapsed time, DNA was isolated and quantified from all samples, and DNA profiles developed from select samples.

DNA yields varied from 80-190 ng and 10-200 ng for blood samples deposited on linoleum and cotton respectively, regardless of swab method used. While no trends were observed in comparing the DNA yields of samples extracted from blood collected with either swab type, degradation indices tended to be lower for Biosafe as compared to cotton swabs. Contact DNA samples yielded between 0.1-1.5 ng and 0.5-5 ng on t-shirt and keyboard samples respectively, with higher yields found with samples swabbed using the Biosafe swabs on both substrates, and lower indications of degradation with the Biosafe swabs. Because touch or contact samples are known to harbor higher bacterial loads than blood in addition to the free DNase enzymes known to inhabit keratinized epithelium, the bacteriostatic, desiccating and enzyme-inhibiting capability of the Biosafe swabs may prove to result in better DNA profile outcomes than the standard swabbing procedure.

Keywords: swab, touch, LCN DNA