



B77 Evaluation of a Novel Material, Diomics X-Swab™, for Collection of DNA

Pamela L. Marshall, PhD, Southern University at New Orleans, 6400 Press Drive, New Orleans, LA 70126*

After attending this presentation, attendees will better understand the current issues associated with DNA collection and recovery and the exacerbation of these issues in low copy number DNA analysis. Attendees will be provided with information on a new collection device for DNA and the results of an experimental study to gain an appreciation of the critical role collection devices play in forensics.

This presentation will impact the forensic science community by making attendees aware of critical issues in DNA collection and recovery and by providing information on a novel collection device which offers a potential solution.

Success of DNA typing is related to the amount of target material recovered from an evidentiary item. Generally, the more DNA that is recovered, the better the chance of obtaining a typing result that will be robust and reliable. One method of collecting stain materials is by swabbing. Recovery of DNA from a number of commercially-available swabs is not an efficient process. The X-Swab™ is a unique bio-specimen collection material which can be dissolved during certain extraction conditions. Therefore, more DNA may be collected from a substrate and be released from the swab matrix than other swabs. The ability to recover DNA from the X-Swab™ and success in Short Tandem Repeat (STR) typing were compared with the Copan 4N6FLOQSwab™, a device which utilizes a proprietary flocked-swab technology to maximize DNA collection and elution efficiency. Both types of swabs were impregnated with known amounts of DNA and body fluids (replicates of 10) and allowed to air dry. In addition, blood was placed onto glass slides (replicates of 10), allowed to dry, and collected using both types of swabs. DNA recovery was assessed by DNA quantitation and by STR typing. X-Swab™ material had a significantly higher DNA recovery at the 1:10 (p value=0.008) and 1:50 dilutions of whole blood (p value= 2.1×10^{-7}). For dilutions of saliva, a significantly higher DNA yield was observed for X-Swab™ material for the 1:5 (p value= 1.1×10^{-7}) and 1:10 dilutions (p value=0.002) compared with DNA recovery from the 4N6FLOQSwab™. For the 1:10 dilution bloodstains, the X-Swab™ and the 4N6FLOQSwab™ had very similar average DNA yields ($62\text{ng} \pm 17$ and $73\text{ng} \pm 27$, respectively; p value=0.82), even though the X-Swab™ surface area and volume were considerably smaller. For the 1:100 dilution stains, the X-Swab™ yielded nearly twice as much DNA ($6.6\text{ng} \pm 1.5$) as the 4N6FLOQSwab™ ($3.6\text{ng} \pm 1$), but the difference in yield was not significant (p value=0.30). Partial or full STR profiles were obtained for all samples for both swab types at both dilutions using the PowerPlex® ESI 17 Pro System. For both the 1:10 and 1:100 dilutions, the X-Swab™ yielded higher Relative Fluorescence Units (RFU) values at all loci. The results demonstrated that the X-Swab™ material yielded greater DNA recovery, particularly of low quantity samples, compared with the 4N6FLOQSwab™. Results also indicated that the X-Swab™ material itself enhanced yield of PCR products.

DNA Collection, DNA Recovery, Diomics X-Swab™