

Evaluation of Water Soluble Tape for Collection of Touch DNA from Crime Scenes

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Touch DNA is transferred to garments and items from skin cells that are shed through sweat and oils. Touch DNA contains fewer cells; therefore, it can be difficult to obtain a full profile. Current methods of collecting touch DNA include double swabbing, scraping, or vacuum swabbing an item once it is submitted to a laboratory. These collection methods can result in a loss of DNA.

The goal of this study was to develop a novel technique for collecting touch DNA from fingerprints and touched garments using water-soluble tape. This method will help to reduce the loss of DNA as compared to other collection methods. The recovery efficiency of the tape was initially evaluated, as was the potential downstream implications for inhibition based on quantification results and generated electropherograms. An epithelial cell slurry was made using buccal swabs from a single donor. The cell slurry was spread onto three replicates of 1x1 inch pieces of either water-soluble tape, sterile swabs, or pipetted directly into clean microcentrifuge tubes. DNA was extracted using a phenol:chloroform extraction. The quantity obtained from the liquid cell slurry represented a theoretical 100% extraction efficiency. The DNA recovered from the swabs and dissolvable tape were 89% (Standard deviation = 0.03) and 66% (Standard deviation = 0.05) respectively. No inhibition was observed on the internal positive control from quantification or from electropherograms in the tape samples. Additionally, no stochastic artifacts were observed when samples were typed with PowerPlex® 16HS. These results suggest that dissolvable tape lifting of touch DNA items is a suitable collection technique.

The water-soluble tape was then evaluated for collecting touch DNA at crime scenes. Ten volunteers were asked to place their thumbs onto three separate glass slides for 30 seconds, without washing their hands for at least 15 minutes beforehand. Thumbprints were left by volunteers on three separate days with the same finger. For each set of slides from a single donor, one was swabbed using the double swab method moistened with SDS, one was lifted with normal tape and swabbed with the aforementioned method, and one was lifted using the water-soluble tape. DNA quantity recovered from each method was compared and percent recovery of donor alleles was analyzed after typing their reference samples. It was determined that double swabbing with a 2% SDS solution was the most efficient at recovering touch DNA from the glass slides. Extracting directly from the water-soluble tape, however, did recover significantly more genetic material as compared to swabbing the tape.

Water-soluble tape is a suitable DNA collection technique, and is comparable to other collection techniques that are currently used in most laboratories.
