A62 The Optimized Use and Recovery of DNA From Tape Lifts

Shannon R. Peters, BS, and David R. Foran, PhD, Michigan State University, Forensic Science Program, 560 Baker Hall, East Lansing, MI 48824*

After attending this presentation, attendees will become familiar with the efficacy of multiple types of adhesive tape used to collect cells, as well as multiple methods for the retrieval of cells from the tape.

This presentation will impact the forensic science community by identifying efficient methods for using adhesive tape to collect cells. These methods can then be applied to various crime scene items from which a DNA profile is desired.

There has been minimal research into what type of tape is best suited for the collection of cells, or how to retrieve DNA from adhesive tape, despite the potential benefits. For instance, tape lifts may prove more effective on clothing than a moistened swab, given that the wetting agent may actually soak into the cloth. Likewise, there is the potential for a suspect to leave behind skin cells on tape used in a crime, such as holding together components of an improvised explosive device or sealing a container to prevent its opening.

The goal of this study was to identify the most effective tape(s) for collecting cells for subsequent DNA analysis by comparing the DNA yields from multiple types of tape (e.g., invisible tape, electrical tape, packing tape, surgical tape, fingerprint lifting tape, etc.). Different recovery techniques were also compared, including the use of foam or cotton swabs moistened with different adhesive removers, digestion buffer, and water. The isolated DNA was characterized throughout using commercial STR kits to ensure recovered DNA was of a quantity and quality adequate for analysis.

In preliminary experiments, known volumes of blood were spotted directly on the tape. Swabs moistened with one of the agents were used

to wet the tape, loosen the cells, and collect as much of the stain as possible. DNA was then extracted organically and quantified using Real Time PCR to determine what percentage of the blood had been retrieved. Next, known volumes of blood were allowed to dry on Petri dishes and then lifted with tapes; any cells remaining on the surface of the dish were collected on a swab moistened with digestion buffer. Cells were again removed from the tape lifts using the solutions above, followed by extraction and quantification of the DNA.

Previous studies examining the isolation and purification of DNA from tape lifts have generally employed Chelex extractions; however, these are rarely conducted in crime labs today. For this reason, the more widely used organic extraction was compared to a commercially available kit using methods optimized in the tape lift portions of the study.

Taken together, the results show the utility of using tape to collect DNA from surfaces that may be associated with a crime scene, including clothing and firearms. Tape may likewise serve as a source of DNA from the perpetrator or someone involved in the crime. Clearly optimizing cellular retention on tape, along with its subsequent recovery and DNA analysis, is of prime importance if such adhesives are to be widely used by the forensic community.

DNA, Tape Lifts, Adhesive Remover

 ** Presenting Author*