A59 Comparing Wearer DNA Sample Collection Methods for Determining the Best Method for the Recovery of Single Source Profiles

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After attending this presentation, attendees will have a better understanding on how to most effectively collect wearer DNA. Attendees will also see how the currently used collection methods compare to a new gel film method.

This presentation will impact the forensic science community by demonstrating which collection method best collects DNA from the last wearer of an item. This may allow for a reduction of mixtures that are not interpretable, often associated with wearer DNA.

Wearer DNA is the deposit of epithelial cells on clothing worn by an individual. Detection of the last individual to handle or wear an item is often an important determination in forensic science.

The most commonly used collection methods for wearer DNA include swabbing and scraping. These often result in mixture profiles. The detection of a single individual who last wore or came in contact with an item is desirable. Recently, adhesives have been introduced as a possible reliable method for the collection of biological evidence. Adhesives have a tendency to recover less, but more recently deposited particulate than the current methods because they are less invasive. The ability to observe the collected cells with the aid of a microscope is another advantage of using adhesives.

The goal of the research was to compare the current collection methods of swabbing and scraping with a gel film called Gel-Pak '0' which shares similar properties with adhesives. Gel-Pak '0' has been previously studied in comparison to other adhesives for the collection of epithelial cells, and was shown to recover the top layer of loose particulate. The particulate was deposited by the individual who last came in contact with an item. Therefore, in comparison to the other two collection methods, Gel-Pak '0' was hypothesized to recover single source profiles on clothing items from the most recent wearer.

DNA analysis was performed on samples collected by the three methods from various clothing items including baseball hats, t-shirts, sweatpants, socks, and other items commonly submitted to crime labs for DNA analysis. The habitual wearer and second/last wearer wore each item for a predetermined amount of time.

Research findings revealed that Gel-Pak '0' collected less DNA compared to the other two methods for the majority of items sampled but did not recover single source profiles from the last wearer. Instead, all three methods resulted in DNA mixtures. Low levels of DNA associated with wearer DNA often resulted in peak height imbalance and stochastic effects. This prevented the determination of major and minor contributors for the majority of items sampled. Even with mixed profiles, the last wearers' profiles were more discernable with Gel-Pak '0' and swabbing, while scraping had a tendency to recover more DNA from the habitual wearers. There was no significant difference in which swabbing or Gel-Pak '0' most frequently collected more of the last wearer's DNA. However, swabbing resulted in slightly more interpretable profiles from the last wearer and an increase in overall CODIS eligible profiles compared to Gel-Pak '0'.

This research may reveal how best to collect wearer DNA. Swabbing and the use of a gel film or adhesive preliminarily shows to be more effective in detecting who last wore a piece of clothing while scraping best determines the habitual wearer. Revealing individuals who last wore an item can be of great importance in forensic science, and therefore, further research with various adhesives and gel films could be vital for solving forensic investigations.

DNA Collection, Wearer DNA, Gel-Pak '0'

 ** Presenting Author*