Technical Note

Integrating DNA Collection into the Latent Print Section

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Abstract: DNA laws across the nation are changing and, as a result, offenders who have been convicted of less serious crimes are now required to give DNA samples. Because these new laws are in effect, the possibility of linking and solving crimes is increased with the aid of the Combined DNA Index System (CODIS). The purpose of this paper is to provide information about potential DNA sources on common evidence items that are encountered by latent examiners and to explore the ways that limited DNA collection might be incorporated into a latent print section. Case examples are provided to illustrate the benefits of this process.

Introduction

DNA evidence is routinely collected for use in investigations and in court. DNA profiles from cases that lack suspects are entered in the Combined DNA Index System (CODIS) for comparison to DNA profiles from convicted offenders. As states

expand the types of offenders who must submit DNA samples, the number of hits between evidence samples and offender samples is expected to increase. The Virginia Division of Forensic Science estimates that 35% of the violent crimes they solved with their databank involved individuals with property crime records [1]. For this reason, there is growing interest in retrieving DNA from all types of cases.

When DNA and latent print evidence overlap, the priority of one over the other is often unclear. Although DNA evidence is often collected before the latent section receives the evidence, there may be times when a latent examiner may be best suited to collect and preserve both the latent print and the DNA evidence.

The State of Alaska Crime Lab has had cases where DNA testing was not requested by the submitting agency, but the latent print examiner realized that DNA testing would be appropriate and possibly useful. Because coordinating evidence collection with another section can be inefficient and possibly destructive to print evidence, there are benefits to having latent examiners involved in the evaluation and collection of certain biological stains.

Background

DNA testing has long been associated with body fluid stains such as blood, semen, and saliva. DNA typing is now sensitive enough to detect DNA from objects that have merely been handled [2]. This increased sensitivity to detect DNA has forced analysts to process items that had been previously overlooked as DNA sources.

The success rate for obtaining a DNA profile on handled objects appears to depend on a number of factors. If the handler is a good shedder of cells, there is a better likelihood that DNA can be detected [3, 4]. The surface of the handled object also has a significant influence. Porous and rough substrates may be favorable for the recovery of DNA [3].

There can be a conflict between collecting DNA and preserving fingerprint evidence. For example, a smudged or smeared finger impression on a critical crime scene object, such as a firearm or knife, may contain both fingerprint and biological

evidence. Sweat and oil residue deposited as a latent print may include DNA-bearing cells [3]. The evaluated latent print may not be suitable for identification, yet the smear may contain sufficient DNA for typing.

Latent print examiners are capable of both evaluating latent prints and collecting DNA evidence, eliminating the need for another section to check out the evidence and issue a report. Latent print examiners are familiar with a wide variety of evidence items, including burglary tools, drug baggies, tape, firearms, paper items, and household articles. In addition, research has found that many of the common latent print reagents do not significantly impact DNA typing results [5-9]. This leaves an option for collecting DNA evidence either before or after latent print processing. Although latent print examiners may be reluctant to swab for DNA and to have the burden of additional documentation, many of these individuals already have the necessary skills and experience to perform such tasks. Latent examiners who function as crime scene analysts already document and swab for blood at crime scenes. The analysts at this lab have been trained to swab areas at crime scenes that are not typically suitable for fingerprints: textured steering wheels, finger smudges on vehicle windows, and the mouth area of soda cans and bottles. Swabbing for invisible stains merely requires careful consideration of appropriate areas to sample, and taking this skill from the field to the laboratory setting is relatively simple.

Procedures

The State of Alaska Crime Lab has a screening section that documents the presence of visible stains, such as blood, and isolates these stains for the DNA section. The screening section also collects "invisible" stains, such as saliva, when the officer requests such an exam. On occasion, an officer may not be aware that a DNA request would be appropriate. In these instances, latent print examiners are trained to be aware of the types of cases where DNA might be present and are encouraged to collect and preserve the DNA evidence. Because of complexities involving bloodstain interpretation, sampling, and presumptive testing, this lab has found that DNA collection by latent examiners is best limited to nonvisible DNA sources such as saliva and cellular material.

Protocol

Our latent section protocol for isolating DNA samples includes the following:

1. Standard casework precautions are observed to prevent sample contamination (e.g., clean work table, evidence on fresh sheet of paper, new gloves, and new or cleaned sampling materials).

2. The sample is isolated from the item by cutting a portion of the item or by swabbing its surface.

   Cutting Method:

   Clean utensils are used to cut out areas of interest (e.g., a gummed portion of an envelope or a section of adhesive tape). Samples are packaged in accordance with laboratory policy.

   Swabbing Method:

   Two swabs are used to sample each stain (e.g., mouth of bottle). The first swab is moistened with one drop of water and the second one is used dry. After sampling, these swabs are air-dried and packaged together as one stain. The swabs are packaged in accordance with laboratory policy.

   Sterile, deionized water (prepared by the DNA section) is used for moistening swabs. The bottle of water is changed monthly. (When the bottle is opened, the date is noted on the bottle.) The lot number of the water assigned by the DNA section is recorded in the analyst's notes.

   Although deionized water is preferred, tap water may be used as long as a control swab of the water is prepared and packaged separately.

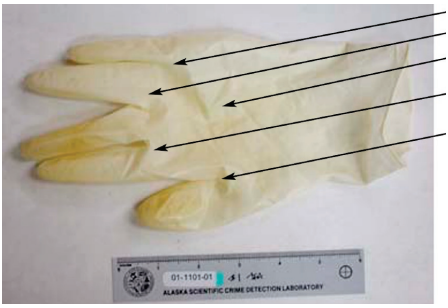
3. DNA analysts are notified about any processing techniques that were performed prior to the collection of the sample.

Documentation

Latent print examiners at this lab routinely document the appearance of evidence items through digital photography. Incorporating the location of isolated stains on these notes and including a paragraph in the latent print report have been relatively simple. These notes have also been helpful in reviewing for court.

An example of information found in case notes is provided in Figure 1.

ITEM #1 LATEX GLOVE



Sample #1.1
Swabbed areas between fingers and dime-size area on center of palm (both sides of glove).
dH_2O Lot #02-0228KD
Packaged as Item #1JFA.

(As Received) Glove apparently inside-out, based on wrist seam. Collected swabs. Processed "inside" for latent prints, then "outside".

Figure 1

Case notes.

The protocol manual indicates that it is left to the discretion of the examiner to determine the order of the processing, including at what stage the DNA sample is taken. This decision is based upon the training and experience of the examiner and is dependent upon the nature and condition of the evidence.

Case Examples

The latent print section in the State of Alaska Crime Lab has swabbed for DNA on evidence such as soda cans, bottles, envelopes, latex gloves, finger smudges on furniture, grips on guns, and cigarette butts. Sometimes the collection is performed prior to processing for prints; other times the decision to collect is made after processing. The case types typically include burglaries or crimes against people. In general, the cases are those in which the officer does not request DNA testing, and usually there is no suspect. The value of generating DNA profiles on "no suspect" cases is for the possibility of identifying a suspect through a match in CODIS.

To illustrate the value of swabbing for DNA, three case examples are provided.

Case 1: A pop-up style popsicle wrapper was recovered from the scene of a burglary. The mouth area of the popsicle wrapper was swabbed for DNA by a latent print examiner prior to the wrapper being processed for latent prints. No suitable prints were detected on the wrapper. A genetic profile was obtained from the swab sample and it was entered into CODIS. There was a hit with a DNA profile that crime scene analysts had obtained from the mouth of a bottle at a separate burglary scene. Although this match did not lead to the identification of a suspect, it did provide a link between two investigations.

Case 2: A handgun in a drug case was submitted for latent print examination. The handle grips, trigger, and slide grips of the handgun were swabbed prior to processing. No suitable latent prints were detected. The limited DNA profiles generated from the swabs did not qualify for entry into CODIS. Another sample from the case (toothbrush) did have a suitable DNA profile to enter into CODIS. The toothbrush profile matched a suspect profile in the database. Similarities in the limited profiles from the handgun to the profile from the toothbrush may provide an important link to the suspect when a known suspect sample is submitted for validation.

Case 3: Three beer cans and a beer bottle from a burglary scene were swabbed prior to latent print examination, which did not reveal suitable prints. The subsequent DNA testing indicated the presence of three distinct male DNA profiles, providing important investigative information for the case.

Our laboratory has experienced roughly a 50% success rate in obtaining DNA profiles on handled objects. There has been a higher success rate for typing saliva stains from cigarette butts and from the mouths of bottles and cans. Sometimes complex, mixed DNA profiles are found, limiting the value of the results. If there is a clearly identifiable major profile, it can be entered in CODIS. Otherwise, the profiles are also useful for comparison when a suspect is identified through other means.

Conclusion

Initially there was a concern that the latent print section would be overwhelmed with the task of swabbing items for DNA. This has not been the reality. Since DNA collection is limited to those cases where the officer does not request the testing, there have been only a handful of cases each month that involve a latent examiner swabbing for DNA evidence. The procedures discussed in this paper may be useful to other laboratories that want to consider integrating limited DNA collection with their latent print processing.

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