B13 Determining the Most Efficient Location for Collecting DNA Samples From Hand Guns

Kaitlyn M. Redman, BS, 190 Robin Ridge Road, Feeding Hills, MA 01030; Kathryn E. Hoodenpyle, MS, 425 E Phelps Street, Springfield, MO 65806; Jill Therriault, BS, Connecticut Department of Emergency Services, Division of Scientific Services, 278 Colony Street, Meriden, CT 06451; Arielle Van Deusen, BS, CT Department of Emergency Services, Division of Scientific Services, 278 Colony Street, Meriden, CT 06451; Jessica Best, MSFS, Connecticut Forensic Lab, 278 Colony Street, Meriden, CT 06451; and Michael S. Adamowicz, PhD, University of New Haven, Dept of Forensic Science, 300 Boston Post Road, West Haven, CT 06516*

After attending this presentation, attendees will better understand the most effective locations to collect samples from hand guns for forensic DNA testing. This study presents data regarding the quantity and quality of DNA recovered from discrete locations on semi-automatic and revolver-style hand guns. It also presents data contrasting the collection of DNA from "overall" swabbing of a firearm versus targeted area collections.

This presentation will impact the forensic science community by providing further experimental data regarding the optimal strategy to use when collecting samples from hand guns for DNA analysis. This data will assist analysts with targeting the areas on hand guns that are most likely to yield the highest quantities of DNA for Short Tandem Repeat (STR) analysis while avoiding collecting wasteful extra samples that show poor results.

DNA recovery from firearms was evaluated in order to determine the most efficient location(s) for the collection of DNA evidence. Previously cleaned firearms (Glock® 19, Beretta® 92, Smith & Wesson® 10-5, and Taurus® Ultra-Lite) were handled for approximately one hour, including having the actions repeatedly worked and then discharged prior to sample collection using a double-swab method (moistened and dry). Results from the individual area swabs of two revolvers and two semi-automatic pistols were compared to an overall swabbing strategy. The areas of focus for both types of hand guns were the backstrap, grip, trigger, and front sight blade. Samples were also collected from the revolvers' cylinder and hammer and the semi-automatic pistols' slide and magazine.

Standard methods of DNA analysis utilized in forensic laboratories were used, including quantification and amplification. All cleaned firearms were checked for background DNA using control swabbings prior to each handling cycle. Each collection area was first assessed by the average recovered yield of DNA. DNA profiles were then generated and analyzed by comparing the sample profiles to known profiles obtained from the firearms' handlers. Profiles were assessed by examining the total number of alleles out of the possible 30 and total number of complete loci out of 15. Profiles with less than ten loci present were processed with the MinElute® post-purification kit to improve the profile results. Each DNA profile was also checked for allele drop-in, indicating low-level mixtures or contamination.

The focus of this research was to determine whether an overall gun swabbing strategy or an individual area swabbing strategy would produce better DNA profile results. The goal was to discern which one was better in an effort to decrease DNA backlogs by eliminating the large number of samples submitted per case. Upon analyzing all data, it was found that the most efficient collection method was to swab an individual location as opposed to taking an overall gun swab. Both the overall and individual area swabs were capable of producing full profiles; however, the overall gun swabs had a greater chance for allele drop-in and mixtures with a minor contributor when their electropherograms were examined. For the revolvers, the best collection location (average DNA yields >0.01ng/µL, least allele/locus drop-out) was the grip. The semi-automatic pistols' best locations for collection (average DNA yields >0.01ng/µL, least allele/locus drop-out) were the grip and front sight blade. Collections from the backstrap area of both types of hand guns also often yielded substantial quantities of DNA. The magazines of the semi-automatic pistols were good collection areas as well. The triggers of each of the firearms were generally poor targets for swabbing, with low average DNA yields (average DNA yields <0.01ng/µL).

DNA, Firearms, Collection

*Presenting Author