A Pilot Study to Evaluate Baseline Quantities of Recovered Touch DNA from Pistol and Ammunition[1]

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After attending this presentation, attendees will be familiar with collecting touch DNA samples from a pistol and ammunition, the DNA profile results from different parts of the pistol, and interpretation of results.

This presentation will impact the forensic science community by describing a method of collecting touch DNA on a pistol and interpreting distribution of profiles on different parts of the pistol and on ten rounds of ammunition.

The recovery of DNA samples from firearms has proven invaluable in the course of forensic investigations, in large part due to improvements in DNA sample collection, preservation, processing, and result interpretation. Typically, this type of evidence yields a limited quantity of biological material containing DNA template from perspiration and epithelial cells, the source for "touch DNA" samples. The quantity of DNA recovered by swabbing can vary based on the frequency of handling and cleaning surfaces of firearms, types of cleaning oils and solvents, physiology of the handler, number of contributors, and downstream testing methods. This research was conducted to evaluate the baseline level of Short Tandem Repeat (STR) DNA that can be recovered from a pistol and cartridges.

A 9mm Smith & Wesson® Model 5906 pistol was handled by one right-handed owner/shooter. The pistol was fired and stored without cleaning for a period of two weeks before swabbing. The shooter removed ten 9mm full-metal jacketed cartridges from a new unopened box of American Eagle® ammunition, loaded a full magazine, then inserted the magazine into the pistol and ejected it. The pistol, full magazine, and the original ammunition box were collected and swabbed for DNA as follows: two swabs were collected from the ammunition box, one swab was collected from the outer cardboard package, and one swab was collected from the inner plastic case holding the cartridges. A total of five swabs were collected from the magazine's right, back, left, front, and base sides; ten swabs were collected, one from each 9mm cartridge, ordered by sequence of insertion into the magazine. Finally, 19 swabs were collected from the 9mm pistol to cover right side surfaces, left side surfaces, top surfaces, and specific parts of the pistol such as the trigger, trigger guard, and hammer. All samples and appropriate controls were collected using the COPAN® Crime Scene 4N6 FLOQSwabs™ that were pre-wetted with sterile water. DNA samples were extracted using the COPAN® Nucleic Acids Optimizers (NAO), a semi-permeable basket which retains fluid until centrifuged with the PrepFiler® Express™ on the AutoMate Express™ DNA Extraction System by Life Technologies™. DNA quantitation was performed using the Quantifiler® Human DNA Quantification Kit by Life Technologies™. The AmpFLSTR® Identifiler® Plus PCR Amplification Kit by Life Technologies™ was used for DNA amplification, the fragments were run on the Applied Biosystems™ 3130 Genetic Analyzer by Life Technologies™, and the analysis was performed with GeneMapper® ID-X v1.4.

The results show full STR profiles from the user on the cartridge box (one of two swabs), magazine (four out of five swabs), and various areas on the pistol (12 out of 19 swabs). Even though this shooter was right handed, a complete DNA profile was obtained on the right side of the pistol safety lever. Characteristically, a right-hand shooter manipulates an ambidextrous

safety on the left side of the pistol; however, possibly in this case, the DNA on the right safety lever originated from the method of retracting the slide on the pistol. The shooter retracted the pistol slide by placing the left thumb on the right side of the slide over the safety lever with the index finger contacting the safety lever on the left side of the slide. Consequently, a DNA profile on one side of an ambidextrous safety does not indicate the shooter's handedness. All swabs from the 9mm cartridges resulted in partial STR profiles with no direct correlation to the number of markers compared to the loading order of the cartridges in the magazine. This data can aid criminal investigators in assessing the probative value of DNA evidence recovered from specific parts of a pistol.

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