A STUDY TO EXAMINE THE QUANTITY OF TOUCH DNA FROM THE SURFACE AREA OF PISTOL COMPONENTS AND AMMUNITION

Maher Noureddine, Ph.D.[1], James A. Bailey, Ph.D.[2] , and Santina Casticiano[3]
[1] ForensiGen, LLC
[2] Minnesota State University Mankato
[3] COPAN Italia

There are approximately 65 million handgun owners in the United States. According to United States Department of Justice, 55 percent of homicides committed annually are with handguns. Even though firearms evidence is often encountered in crimes of violence, it may be encountered in any type of criminal investigation. Biological material containing DNA template from perspiration and epithelial cells are the source for "touch DNA". DNA can be present on different parts of the pistol, magazine, as well as ammunition. The quantity of DNA recovered by swabbing can fluctuate based on factors such as the physiology of the subject as well as the frequency of contact with the pistol and cleaning procedure. Two physiological factors that may influence the presence or absence of touch DNA is xeroderma, dry skin and hyperhidrosis, a condition characterized by abnormally increased perspiration. It is estimated that 2.8% of the population of the United States have hyperhidrosis. Consequently, subjects with hyperhidrosis can have a propensity to leave more touch DNA than others. Swabbing methods can also have an impact on the recovery of touch DNA. For instance, swabs from textured surfaces can yield a higher quantity of DNA template than smooth surfaces. This research examines the quantity of DNA on the surface area. A 9mm Smith & Wesson Model 5906 pistol was handled by a right-handed subject after being fired and stored without cleaning for a period of fourteen days before swabbing. The subject removed ten (10) rounds of 9mm full metal jacketed cartridges from a new box of Federal ammunition, loaded a magazine and then removed the cartridges. The pistol, magazine, cartridges and the cartridge box were swabbed for DNA. Swabs were collected on the right and left sides of the grip, safety catch, slide serrations, slide, and frame. Swabs were collected from the trigger, top of the slide, back of the grip, front of the grip, slide release, hammer and magazine release. One swab was collected from the forcing cone in the chamber. Swabs were collected from four sides and the bottom of the magazine. In addition to the pistol, one swab was collected from each of the 10 cartridges loaded and unloaded from the magazine. Two swabs were collected from the cartridge box. The surface areas ranged from ~ 161.29mm² to 4193.5mm² on the pistol. All samples and appropriate controls were collected using the COPAN Crime Scene 4N6 FLOQSwabs™ (Copan Italia, Brescia, Italy) 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 analyzed with the Applied Biosystems® 3130 Genetic Analyzer by Life Technologies and the analysis was performed with GeneMapper® ID-X v1.4. DNA quantitation data as well as STR profiles from the user will be presented. In conclusion, the results indicate that the larger surface areas swabbed on the pistol did not result in higher quantities of DNA compared to specific parts or smaller surface areas swabbed for DNA. This data can aid criminal investigators and forensic analysts in developing testing strategies and assessing specific parts of a pistol and ammunition for biological evidence.