RECOVERY OF STR DNA FROM SURFACES OF THE AR15 AUTOMATIC RIFLE USING SINGLE 4NGFLOQSwab METHOD

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The recovery of biological evidence from firearms is crucial to criminal investigations. Whether the case involves mass shooting or unlawful possession, systematic and hypothesis- driven evaluation of "touch" DNA evidence on a firearm will be greatly enhanced with improvements in swabbing techniques, sample extraction, and downstream data analysis. The quantity and quality of DNA recovered from firearms can vary greatly due the physiology of the handler/shooter, the frequency of handling and cleaning the surfaces of the firearm, the type of firearm, the number of contributors, and sample collection methods. A popular method of collecting DNA evidence from a firearm is the double swab method, whereby a wet swab is first used to hydrate and collect the biological material, followed by a dry swab to collect as much of the remaining sample as possible. Many forensic testing laboratories will opt to combine the wet and dry swab in a single extraction. This swabbing technique will often be coupled with swabbing multiple firearm surfaces at the same time. While these approaches can maximize the quantity of total DNA collected, the probative value from such samples can diminish due to the possible creation of artificial mixtures that can render any profile data from a firearm useless. In this study, we evaluate the recovery of "touch" DNA samples by using a single swab method on several individual surfaces of the AR15, a popular automatic rifle. A total of 16 individual surfaces of an AR15 rifle (belonging to a right handed owner/shooter) were swabbed for DNA using the COPAN 4N6FLOQSwabs™ (Copan Italia, Brescia, Italy) that were pre-wetted with 15 uL of sterile water. Individual swabs 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. DNA profiles that are attributable to the owner/shooter were obtained from 14 out of the 16 areas swabbed on the AR15. Therefore, practitioners are urged to consider using the single 4N6FLOQSwab technique for collecting "touch" DNA evidence from specific areas on firearms.