B60 Analysis of Nuclear DNA From Exploded Bomb Fragments and Spent Cartridge Casings

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After attending this presentation, attendees will understand the strengths and limitations of STR analysis on human DNA recovered from exploded bomb fragments and spent cartridge casings.

This presentation will impact the forensic community and/or humanity by demonstrating the probative value of DNA evidence from explosive devices and firearms and the limitations of standard analytical methods with the testing of low copy number DNA samples.

The purpose of this research was to evaluate the persistence and condition of human DNA recovered from the fragments of exploded, simulated pipe bombs and from the cartridge casings and inner workings of discharged firearms. In this study, the DNA samples were quantified by Real-Time PCR with the ABI Quantifiler™ Kit and the ABI Prism® 7000 Sequence Detection System. The samples were STR typed by use of the AmpF*l*STR® Identifiler® PCR Amplification Kit and the ABI Prism® 310 Genetic Analyzer. The genotyping data was analyzed with the GeneMapper® *ID* Software v3.2, and the peak amplitude threshold was set at 25 RFU.

In the first experiment, liquid human blood was liberally applied to the edges of four longitudinal sections of pipe. Four different pipes were used: galvanized steel, copper, iron, and PVC. A small amount of C6 was placed in each half-section of pipe. The explosive devices were covered with a bomb blanket and detonated within a concrete cylinder with a dirt floor. The fragments were collected and examined for blood. The blood on the fragments was visible macroscopically as blackened stains. Complete STR profiles were obtained from the swab samples of the bloodstains on the four pipe sections.

In the second experiment, a known quantity of DNA (in the form of blood) was deposited on the surface of the casing of three .25 caliber, three .380 caliber, and three 9mm cartridges, which were then discharged from the appropriate firearm. A swabbing was taken of each spent casing and analyzed. The average amount of DNA recovered from the casings was less than half of the starting amount; however, complete STR profiles were obtained from all of the casings.

In the third experiment, five female and five male subjects each loaded three 9 mm cartridges into a 9 mm Luger magazine. The subjects were instructed not to wash their hands one hour prior to handling the ammunition. The cartridges were discharged, and the casings were sampled by swabbing. The amount of DNA recovered from the casing samples ranged from zero to 0.93 ng. Limited typing information was derived from these samples. Many samples showed discordant typing results with a peak amplitude threshold of 25 RFU.

This study demonstrates that, under the test conditions, human DNA can persist on exploded bomb fragments and spent cartridge casings in a quantity and quality suitable for typing. However, the success of the analysis is limited by the amounts of DNA deposited on these items through handling.

Exploded Bomb Fragments, Spent Cartridge Casings, Discharged Firearms

 ** Presenting Author*