Abstract 82

STR ANALYSIS OF HUMAN DNA FROM EXPLODED BOMB FRAGMENTS AND SPENT CARTRIDGE CASINGS

Katherine A. Roberts[1], Ph.D., Kenneth L. Sewell[2], M.S., Donald J. Johnson[1], M.S., Learden K. Matthies[2], M.S.
[1]California State University, Los Angeles
[2]Los Angeles County Sheriff's Department

This study evaluated 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. The DNA samples were quantified by Real-Time PCR with the ABI Quantifiler™ Kit and the ABI Prism® 7000 Sequence Detection System, and STR typed by use of the AmpFlSTR® Identifiler® PCR Amplification Kit, the ABI Prism® 310 Genetic Analyzer, and the GeneMapper® ID Software v3.2. 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 C-6 was placed in each half-section of pipe. Each explosive device was placed in a concrete cylinder with a dirt floor, then covered with a bomb blanket and detonated. The fragments were collected and examined for blood. The blood that remained on the fragments was macroscopically visible as blacken stains. Complete STR profiles were obtained from the swab samples of the bloodstains on each of the four types of pipes. In the second experiment, a known quantity of DNA (in the form of blood) was deposited on the surface of the casing of twelve .25 caliber, twelve .380 caliber, and twelve 9mm cartridges, which were then discharged from an appropriate firearm. The first, sixth, and twelfth spent casing from each set was sampled with a swab 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. Additionally, analytical amounts of DNA were recovered from the breech face, ejection port, and chamber of each of the firearms after the twelve rounds were fired. In the third experiment, five female and five male subjects each loaded three 9mm cartridges into a 9mm Luger magazine. The subjects were instructed not to wash their hands one hour prior to handling the ammunition. One cartridge of each set was discharged, and the spent casing was sampled by swabbing. Another cartridge of each seat was unfired and the casing surface was sampled by swabbing. The amount of DNA recovered from the unfired cartridge casings ranged from 0.0 to 17.4 ng; the amount recovered from the spent casings ranged from 0.0 to 0.92 ng. Limited typing information was derived from the samples of both the unfired and fired cartridge casings. 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.