B114 Recovery of DNA From Secondary Transfer to Weapons

James Sebestyen, BS, Marian G. Acevedo Álvarez, Ewelina Badja, BS, Jeannie Tamiriz, BS, Mechthild Prinz, PhD, and Theresa A. Caragine, PhD, Office of the Chief Medical Examiner of the City of New York, Department of Forensic Biology, 520 First Avenue, New York, NY 10016*

The goal of this presentation is to demonstrate that although DNA is detected from secondary transfer, probative profiles are only generated from primary transfer.

This presentation will impact the forensic community and/or humanity by suggesting that the presence of DNA from secondary transfer does not compromise the profile determined from the primary DNA donor.

Studies have demonstrated DNA recovery from cellular material deposited on objects through handling. However, the resultant DNA pro- files often consist of DNA from more than one donor; these individuals touched the object directly (primary transfer) or their DNA was transferred through contact with the primary donor (secondary transfer). When the object handled is a weapon or another item associated with a crime, the implications of secondary transfer of DNA are significant. Therefore, DNA transferred to weapons, from primary as well as secondary transfer was measured, and the profiles generated were evaluated for the presence of the secondary donor.

Nine pairs of individuals each touched a screwdriver, a glass bottle, a wooden bat, a metal rod, a metal handle of a knife, a plastic (wood appearing) handle of a knife, a plastic scissors handle, a handgun treated with gun cleaner or an untreated handgun for sixty seconds. The subjects then shook hands for three seconds with their partner of another gender and touched the same weapon that had been thoroughly cleaned. According to the protocols and interpretation guidelines developed by a high sensitivity laboratory for low copy number DNA, the samples were collected and processed. The DNA recoveries from those weapons handled after hand- shaking were consistently higher than from those subjected only to primary transfer. All of the samples tested for secondary transfer produced mixtures, and although the DNA alleles of the secondary donors were apparent in every sample, they were always the minor contributor.

Alternatively, the partners shook hands before the primary DNA donor touched the weapon, and after cleaning, ten minutes later, the primary donor touched the weapon again. In a third experiment, a weapon was divided into three clean areas and was touched three times by the primary donor following a handshake. In this manner, the persistence of secondary transfer could be calculated. The DNA yield varied from trial to trial, even between replicate scenarios with respect to sequential recovery. Neither the sequence of the handling or the gender of the primary donor appeared to be a contributing factor to the detection of the secondary com- ponent, which was the minor contributor.

For all experiments, the alleles of the major component were always those of the primary DNA donor and often produced a probative profile. Even for partial profiles such as one from an amplification of 4 pg of DNA, the primary donor was included in the major component. Regardless of gender or shedding potential, the minor component was consistently the secondary donor. This minor component could only be deduced at the more robust loci and those containing exclusively heterozygotes. Moreover, some samples consisted of multi-component mixtures, and the alleles of the secondary donor were occasionally the same height as spu- rious alleles. Therefore, no conclusions could be drawn regarding the profile of the minor component, the secondary donor.

Low Copy Number DNA, Secondary Transfer, Weapons

 ** Presenting Author*