

INVESTIGATION OF THE DETECTION OF DNA THROUGH SECONDARY AND TERTIARY TRANSFER

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A DNA analyst cannot discern how DNA was deposited on an item, but rather can attempt to interpret the DNA that is recovered and report those results. To address the concerns regarding the relevance of these results, the circumstances of the case must be considered. For example, the pertinent issues are often whether one would expect that the person in question touched an item prior to the commission of a crime or whether the detected DNA was deposited by means of transfer. The goal of this study was to provide the DNA analyst with experimental data to determine whether DNA could be detected following secondary and tertiary transfer.

For these studies, secondary transfer was defined as the transfer of DNA to an object after skin to skin contact between two individuals. For example, following a handshake, could the DNA of person A be deposited onto the skin of person B and then to an object subsequently handled by person B? Tertiary transfer involved transfer of DNA from skin to object to vector to object. In other words, if person A touched object 1 and person B (the vector) touched object 1 followed by object 2, could person A's DNA be detected on object 2? Both secondary and tertiary experiments were performed using objects that could be fashioned as weapons made of metal, wood, glass or plastic. The objects were handled for one minute each and were swabbed and processed according to the High Sensitivity protocols for Low Template DNA samples, if warranted.

In order to determine the likelihood of these types of transfers, we considered several scenarios. Secondary transfer experiments involved two persons, A and B, shaking hands for five seconds, followed by person B handling a clean weapon such as a wooden knife handle, a glass bottle or a plastic cable for one minute. This sequence was repeated for each of the weapons. A metal rod was also tested with three sequential touches to determine if DNA from person A could be detected with repeated handling of items. For the first tertiary transfer experiment, person A held a clean metal door handle for five seconds, next person B held the same door handle for five seconds. Person B then handled each of the three clean weapons described above sequentially.

To simulate more realistic situations, slight modifications were made. To check for secondary transfer, experiments were conducted with a time interval between the handshake and the handling of the weapons. Similarly, for tertiary transfer, after person B touched the door handle that person A previously held, person B pursued daily activities for 20 minutes and then handled each of the three weapons. Another experiment utilized an item that was regularly handled by person A such as their employee ID card. Without cleaning the item, person A held the ID card for five seconds, then person B held it for five seconds, and immediately thereafter handled three weapons consecutively.

Here, we present and discuss the DNA results generated from these secondary and tertiary transfer experiments. In order to ascertain whether daily contact may increase the propensity for transfer of DNA, we included in our donor pairs an intimate couple who cohabitated. Consideration of all these possible scenarios emphasized that global generalizations may not be accurate but rather all factors in a case must be weighed.