



B209 Touch DNA: “Touch” Time and Resiliency

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After attending this presentation, attendees will better understand touch DNA, the variation in quantity of DNA related to touch time, and what type of methodology can best be used to collect touch DNA.

This presentation will impact the forensic science community by providing information regarding the collection of samples of touch DNA from garments and by clarifying the major aspects of these forensic techniques.

With every touch of the skin on a surface, cells are left behind; with every cell, the genetic code can be found. People touch doors, tables, and so many other surfaces every day, often with multiple people touching the same object throughout the course of a day.¹ New research has found that touch DNA analysis can erroneously implicate a person who had no contact whatsoever with the crime scene as the main contributor of the DNA on its handle.

When a swab is used for evidence collection from a surface, the investigator may not know how many people may have touched this evidence in the past or what level of persistence DNA may have on touched objects over time. Though every touch leaves cells containing DNA, most contact leaves only a few cells if minimal pressure is used. These trace levels of DNA may remain undetected or, if detected, may be at such low levels that only stochastic effects and low levels of allele drop-in are observed.²

The goals of this study are to evaluate how much time (in term of seconds) is necessary to leave touch DNA on a dress and to determine what type of technique maximizes the DNA recovery by evaluating swabs, cuttings, and adhesive tape to sample an area of interest.

To acquire a greater knowledge of the rate of a detectable wearer as well as touch and background DNA, 30 females wore their brassieres for 12h. Subsequently, the lateral regions of each brassier were handled by one of five male volunteers for different lengths of time: 60s, 45s, 30s, 20s, and 10s.

Every experiment was conducted in triplicate. In the first case, the sample was collected by swabbing. The second case employed cutting the area for testing. The third case was sampled with adhesive tape. The quantity of recovered DNA was determined using real-time Polymerase Chain Reaction (PCR) with Alu-based targets and SYBR® Green detection. The samples were also analyzed using capillary electrophoresis-based Short Tandem Repeat (STR) typing to determine the percentage of recoverable alleles. Touch DNA is an emulation of the Locard exchange principle, in that any time a person is in a location, they may leave DNA evidence of their presence.

The results revealed that the best technique to recover touch DNA is to cut the area of interest. The “toucher” was detected as a single profile in samples handled between 60s and 45s. The “wearer” was present in the mixtures obtained from the 30s to 10s samples, but the “toucher” was always observed as the major contributor.

Greater knowledge of the frequency of detection of reportable wearer DNA and toucher DNA allows scientists to evaluate the likelihood of observing a matching profile if an individual wore a garment rather than touched it in disputed case scenarios. Everyone in the medicolegal community — forensic scientists and technicians, DNA analysts, potential jurors, and judges and lawyers for both the prosecution and defense — must know and understand the potential for mistakes.

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