B119 The Extraction of Touch DNA From Chemically Developed, Aged Fingerprints

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After attending this presentation, attendees will better understand how latent fingerprints deposited onto a paper substrate are developed with various chemical reagents, what touch DNA is and how it can be extracted from paper, and how touch DNA can still be recovered several days to weeks after a fingerprint has been chemically developed.

This presentation will impact the forensic science community by demonstrating that fingerprint evidence can be tested for touch DNA even after being chemically developed. This is important in cases such as cold case files or exoneration cases in which fingerprint evidence has been in storage over time after being chemically developed, but DNA testing was either not available or not requested.

Fingerprints recovered from crime scenes are rarely perfect and often require enhancement. For latent fingerprints deposited onto porous surfaces such as paper, developing reagents like ninhydrin can be applied to make the print visible by staining it dark purple.[1] If after development a latent print cannot be used for comparison, the next step may be to test the print for touch DNA. Touch DNA is left behind by a person upon touching a surface and leaving behind DNA-containing skin cells.[2] The development of touch DNA has provided forensic scientists with a tool for extracting DNA from fingerprints when traditional developing methods cannot produce a usable print.

If a fingerprint is not usable for comparison purposes, it can then be tested for touch DNA; however, laboratory backlogs can sometimes leave developed fingerprint evidence sitting in storage for several days, weeks, months, and even years before it can be tested. Several studies have been conducted to examine the effect that developing reagents, such as 1,2-indanedione, have on the recovery of touch DNA from developed fingerprints deposited onto porous surfaces over time.[3,4] It has been shown that DNA can be recovered up to 21 days post-development after treatment with 1,2-indanedione, but research is lacking as to how other reagents for porous surfaces, such as ninhydrin, 5-methoxy ninhydrin, 5-methylthio ninhydrin, genipin, and lawsone, affect future DNA analysis.[3]

To examine the effect of chemical reagents, fingerprints from four participants (two males, two females) were deposited onto personal checks, developed with the reagents listed above, then allowed to age for various time intervals (1-180 days). Reference buccal swabs from the participants were collected for subsequent DNA analysis. A set of control fingerprints were also collected from each participant and were not treated with a reagent. After aging, the samples were swabbed, quantified, amplified, and then analyzed using capillary electrophoresis to determine if a DNA profile could be generated. Results determined that even after treatment with chemical reagents, a genetic profile can be generated for the aged samples. This demonstrates that even in cases in which treated fingerprint evidence is left to sit in evidence for extended periods of time, DNA can still be extracted and used to help identify a suspect.

Reference(s):

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3. Yu, Pei-Hua, and Margaret M. Wallace. Effect of 1, 2-indanedione on PCR-STR typing of fingerprints deposited on thermal and carbonless paper. *Forensic Science International.* 168, no. 2 (2007): 112-118.
4. Azoury, Myriam, Ashira Zamir, Carla Oz, and Sarena Wiesner. The effect of 1, 2-indanedione, a latent fingerprint reagent on subsequent DNA profiling. *Journal of Forensic Science.* 47, no. 3 (2001): 586-588.

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