

IMPROVED METHODS FOR RETRIEVAL AND EXTRACTION OF DNA FROM TAPE-LIFTED, PAPER-BACKED STORED ARCHIVED LATENT FINGERPRINTS

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Several studies evaluated the best collection methods for latent prints and DNA profiling; others separately reported DNA success from adhesives and from paper. However, there are limited resources on best practices for retrieving DNA from latent fingerprints secured *between* adhesive and paper substrates. These samples are often stored for long periods, contain low template DNA, and fail or lead to irresolvable mixtures. Thus, they are often overlooked as viable evidence. The objective was to identify the best combination of DNA retrieval and purification for treated/untreated latent fingerprints that were tape-lifted, secured on paper, and stored at room temperature for varying time periods. Sets of latent fingerprints were provided on glass and paper surfaces. Fingerprints were treated with traditional powders, tape-lifted, and secured on paper. Single fingerprint cuttings were obtained and DNA recovery was assessed using four extraction methods (organic, Qiagen QIAamp® Investigator, Invisorb® Spin Forensic, and ZyGEM® prepGEM™ Tissue). Our findings indicated that, although the paper side holds 3X more DNA than adhesives, DNA is retained on both the adhesive and paper sides of archived fingerprints. Thus, both the paper and adhesive sides should be processed in a combined procedure to improve DNA yields. Overall, the Investigator Kit provided more detectable DNA (53% of tested samples) and the most consistent total DNA yields (1.64ng avg). However, results varied considering visualization techniques; magnetic treated, black carbon powder treated and untreated fingerprints provided the highest DNA yield with the Investigator Kit (2ng avg), organic extraction (0.60ng avg), and ZyGEM® Kit (0.68ng avg), respectively. Furthermore, magnetic or black powder treated fingerprints produced more detected samples and more DNA than untreated fingerprints. This study also examined methods (cuttings vs. single or double swab technique) for DNA retrieval from paper and adhesive sides of archived samples using multiple swab diluents. The double swab technique provides >3X more DNA (0.50ng avg) than the single swab technique (0.11ng) with water as the diluent. Quality of the STR profiles and detected allele counts will also be presented. This experiment will provide valuable information for forensic examiners seeking to process archived fingerprints for DNA typing. As such, cold cases with limited biological evidence could be revisited with more confidence and less apprehension about potentially compromised, low template DNA samples.