



B45 A Comparison of the Overall Quality and Quantity of DNA Evidence From Fingerprints Collected From Various Substrates Found at Simulated Crime Scenes

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Learning Overview: The goal of this presentation is to discuss the effect of the type of substrate on the amount of DNA recovered from fingerprints. Following this presentation, attendees will better understand how the surface texture and characteristics can affect the DNA recovery from various substrates

Impact on the Forensic Science Community: This presentation will impact the forensic science community by contributing to a growing body of knowledge regarding the utility of DNA recovered from fingerprints from different substrates.

Latent fingerprints are biometric features representing one of the most common evidence types that can be used for human identification at a crime scene.¹ The selection of an enhancement technique for visualization of fingerprints depends on a number of factors, including the type of substrate and the location or environment of the fingerprint.² The most common method of enhancement is the use of various types of powders (e.g., aluminum powder, black magnetic powder, black granular powder, etc.).³ The powders function by attaching to the components of sweat released by the fingertips, which reveals details of ridge elements, thereby enhancing the visualization of the fingerprints.

This research study was conducted to determine the effects of fingerprint powders on the collection and subsequent analysis of the DNA lifted from different substrates. For collection, fingerprints were placed on six different substrates (steel, aluminum, unpainted wood, painted wood, glass, and faux leather) for a total of 144 fingerprints and left for four different time periods (1 hour, 24 hours, 1 week, and 1 month). Subsequently, half of the fingerprints were dusted with fingerprinting powder and the others left bare. All 144 samples were collected from their respective time periods and the DNA extracted and quantitated using real-time quantitative Polymerase Chain Reaction (qPCR) with subsequent short Tandem Repeat (STR) analysis. It was found that though the fingerprint powder did not interfere with the subsequent analysis, there was a difference in the amount of DNA recovered from different substrates after one month. The qPCR degradation ratio varied from 1.6 (steel) to 7.25 (unpainted wood) and correlated with the percent degradation by the relative DNA absorbance measured at 260nm. To assess the quality of DNA recovered, the extracted DNA was amplified, followed by capillary electrophoresis, and the results correlated with the qPCR results.

The results of this study will aid crime scene analysts by providing information regarding the most desirable locations to retrieve DNA from fingerprints at a given crime scene.

Reference(s):

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2. Van Hoofstat, D., Deforce, D., De Pauw, I., Van den Eeckhout, E. DNA typing of fingerprints using capillary electrophoresis: Effect of dactyloscopic powders. *Electrophoresis*. 1999, 20 (14), 2870-2876.
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Fingerprint Analysis, Crime Scene Investigation, Substrates