

DETERMINATION OF DNA QUANTITY AND QUALITY ON MULTI-USE FINGERPRINT BRUSHES USED IN FORENSIC CASEWORK



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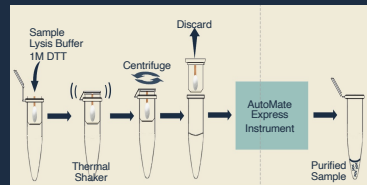
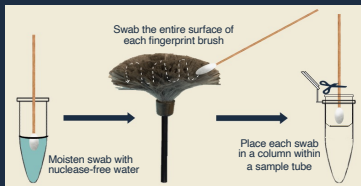
Introduction

Advances in the **sensitivity** of DNA recovery technology has raised **concerns** about the ability to detect small amounts of DNA inadvertently deposited through **DNA transfer**. **Contaminated** forensic tools used during investigations are a **potential vector** of unwanted DNA transfer. **This study** aimed to determine the quantity and quality of DNA present on new and multi-used fingerprint brushes that could potentially result in transfer to successive exhibits. It was **hypothesized** that **higher amounts of DNA** and **more evidence of DNA degradation** would be detected on the **multi-used** than on the new, unused fingerprint brushes.

Methodology

Sample Collection

20 new, unused fiberglass fingerprint brushes (swabbed)
29 multi-use fingerprint brushes previously used in forensic casework (swabbed)

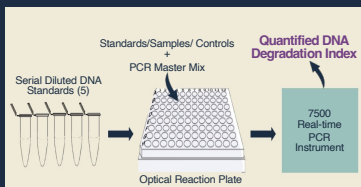


DNA Extraction

Applied Biosystems
PrepFiler™ Express DNA
Extraction Kit body fluids
protocol
AutoMate Express™
Instrument

DNA Quantitation

7500 Real-time PCR
instrument
Applied Biosystems
Quantifiler™ Trio DNA
Quantification Kit protocol



Statistical Analyses

Evaluated data normality and statistical differences between control and sample DNA concentrations using Jamovi™ software

Main Findings

Detectable amounts of DNA were found on both **new and multi-use fingerprint brushes** previously used in forensic casework.

More DNA was detected on **new fingerprint brushes** compared to used multi-use fingerprint brushes.

All fingerprint brushes showed **no inhibition** and showed **similar degradation levels**.



<https://www.shutterstock.com/image-illustration/genetic-fingerprinting-fingerprint-dna-emerging-out-358348655>

Conclusions

The presence of DNA on both new and used fingerprint brushes demonstrates a **potential** for the **transfer of DNA** to evidence items during fingerprint development.

Additional research is required to further understand and **mitigate** the concern of DNA transfer.

Results

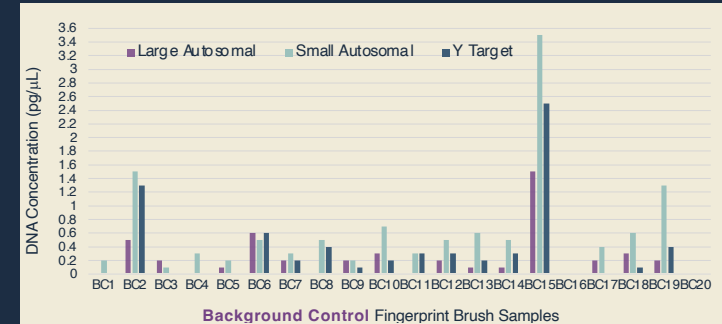


Figure 1: DNA concentration (pg/µL) measured for each of the three targets within the quantitation assay for each of the 20 new, unused fiberglass fingerprint brush background control samples (BC1-BC20).

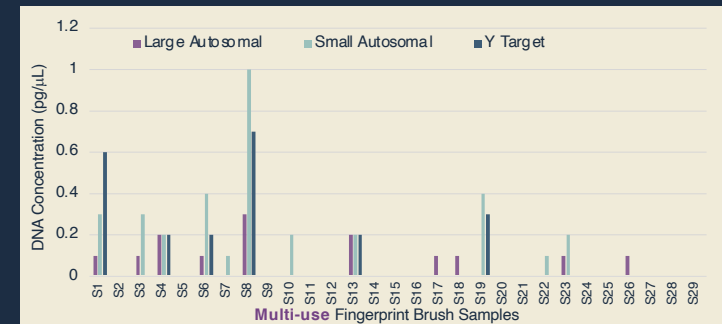


Figure 2: DNA concentration (pg/µL) measured for each of the three targets within the quantitation assay for each of the 29 used multi-use fingerprint brush samples (S1-S29).

Low quantities of DNA were detected in 18 samples collected from the new, unused fingerprint brushes and 14 samples from the used multi-use fingerprint brushes.

New, Unused (Background Control) Fingerprint Brush Samples

Assay	[DNA] Range (pg/µL)
Large Autosomal	0.10-0.30
Small Autosomal	0.10-1.0
Y Target	0.20-0.70

Used Multi-use Fingerprint Brush Samples

Assay	[DNA] Range (pg/µL)
Large Autosomal	0.10-0.30
Small Autosomal	0.10-1.0
Y Target	0.20-0.70

All samples had degradation indices consistent with no or low degradation