STR GENOTYPING OF DNA FROM LATENT FINGERPRINT CARDS

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Background: Fingerprints are a hallmark of human individualization but can not always be relied on to identify the source of the print. Blurred or partial fingerprints may still be of use to law enforcement however, by providing a source of DNA for STR genotype analysis. The purpose of this study therefore, was to analyze fingerprints on evidence cards as a source of DNA for STR profiling. Methods: Fingerprints were provided in the form of paired thumbprints by twenty volunteer donors working at the Kern and Sacramento County Crime Labs. Fingerprints were processed with disposable fingerprint brushes throughout the study and all assays were carried out in duplicate. Several fingerprint dusting powders, lifting tapes and DNA recovery methods were compared in order to optimize experimental conditions. Processed and unprocessed thumbprints were then extracted using the Qiagen EZ1 kit Trace protocol. DNA was concentrated with Millipore Microcon 100 filters and quantitated using Applied Biosystem's (ABI) Quantifiler assay. Fingerprint DNA underwent amplification for STR analysis using the ABI Identifiler, ABI Minifiler and Promega PowerPlex 16 assays. Amplified PCR products were run on an ABI 3130 or 310 CE and all data were analyzed using ABI GeneMapper ID. Results: A median (25th-75th percentile) of .025 (.014-.603) ng of DNA was obtained from 40 paired unprocessed vs. .021 (.008-.048) ng from 60 paired processed thumbprints. Results of STR profiling assays on unprocessed and processed fingerprints are summarized in the table below.

	Unprocessed Fingerprints		Processed Fingerprints		
STR Profile	Identifiler	Minifiler	Identifiler	Minifiler	PowerPlex 16
Complete	30%	40%	30%	30%	70%
Partial	40%	40%	30%	40%	20%
No Profile	30%	20%	40%	30%	10%

The ABI Identifiler assay had 18 instances of locus and 14 of allelic dropout, ABI Minifler had 13L/15A dropout instances while the Promega PowerPlex 16 assay had the lowest number of instances of both locus and allelic dropout (12L/7A) for processed fingerprint DNA. All three STR assays were sensitive to the presence of secondary contact DNA. Conclusions: Use of an STR genotyping protocol designed for use with degraded DNA (ABI Minifiler) did not significantly improve typing results. Use of the low-copy number PowerPlex 16 assay did increase the frequency of complete profiles obtained compared with the ABI Identifiler and Minifiler assays. Latent fingerprint DNA archived on evidence cards may be useful in forensic identification particularly when combined with low copy number STR amplification methods. The possibility of secondary transfer of contact DNA must be taken into account when analyzing results.