OBTAINING DNA-STR PROFILES FROM LATENT FRICTION RIDGE IMPRESSIONS DEVELOPED WITH POWDER AND TRANSFERRED TO ADHESIVE TAPE: SENSITIVITY DOWN TO A SINGLE, INDIVIDUAL FINGERPRINT

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Technically and practically, the ability to obtain a DNA profile from a single fingerprint is probably as small as you can get in terms of 'every contact leaves a trace'. Our laboratory has a long-standing interest in developing practical methods and reagents to recover, extract and purify DNA suitable for multiplex DNA-STR analysis (i.e., DNA profiling) from samples with limited amounts of DNA. A simple to use, consistent and reliable method/kit that would recover DNA suitable for generating profiles from identified friction ridge impressions would,

(i) allow law enforcement to generate scientifically defensible identification data from items of evidence that are currently beyond their scope – e.g., bomb parts, IED fragments, contraband, weapons, ordinance, munitions, packaging, surfaces, handled objects, etc.,-

(ii) reduce the number of complex mixed DNA profiles obtained from 'touch DNA' samples as a single identified fingerprint, if used as the initial evidence, would most likely produce a single source profile, and

(iii) provide law enforcement, investigative agencies and the courts the ability to test the accuracy and precision of latent print comparison for individual identification (in essence a scientific check on latent print identification).

We have developed methods, procedures and new reagents for the consistent and reliable collection, processing, extraction, and purification of DNA suitable for multiplex PCR amplification from latent ridge impressions developed with powders and transferred to adhesive tape (i.e., fingerprints on hinge cards).

We have codified this work into a laboratory standard operating procedure (SOP) suitable for ISO/IEC17025 acceptance. The SOP details the methods, procedures and reagents required to

(a) recover the left-over DNA on the original item of evidence (i.e., the DNA that is not 'lifted' by the sticky tapes / lift tapes / hinge card),

(b) extract the DNA from the adhesive layer of tape (i.e., tame the adhesive),

(c) purify the DNA away from the powder and other contaminants, and

(d) post-PCR purify the amplicons generated by the laboratory's choice of STR kit.

As the amount of DNA present on fingerprints or handled objects is extremely small, our method includes reagents required for post-PCR purification and concentration (AmpliconRx™). The work-flow, examples and kit components are presented and explained. Training modules including competency samples and a commercial quality kit are nearing completion.