

VALIDATION OF DNA TYPING FROM LATENT FINGERPRINTS BY THE INVITROGEN CHARGE SWITCH FORENSIC DNA PURIFICATION KIT

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DNA fingerprinting is routinely used in the forensic field for analysis of blood, saliva, sperm, hairs, but in several crime cases, objects are left at the scene of the crime with, at first sight, no evident traces for DNA profiling. However new technologies permit now to analyze DNA from very small samples, even those that are invisible or latent traces such as prints left onto various surfaces.

The aim of this study was to develop an excellent method to extract and analyze DNA so to obtain reliable DNA profiles from latent fingerprints found in a variety of environmental conditions (temperature, humidity, etc).

In particular were analyzed latent fingerprints found on to porous surface and non-porous before any treatment (using special lamp for the enhancement) and after treatment with DFO, cyanocrilate blue, ninhydrin so to verify the effect of common dyes on DNA extraction.

Moreover, the possibility of studying profiles of DNA obtained from fingerprints allows us to consider that even latent fingerprints left on the skin, may provide cell remains from which DNA can be extracted. In fact here verified the ability to analyze latent fingerprints found on the skin of a victim or a perpetrator after a simulation of an assault. Since highly sensitive methods are required for DNA purification from difficult samples, containing small biological traces, we used the Invitrogen Charge Switch Forensic DNA Purification kit that permits to obtain high quality DNA from a large variety of forensic samples, even if in small quantity. In particular to maximize the recover of DNA from samples, we developed a modified DNA extraction protocol and evaluated the quantity/quality of DNA extracted, the effect of substrate on the extraction (since certain surfaces can lead to interferences with extraction and amplifications,) the quality and reproducibility of DNA profiles obtained.

All samples have been amplified using the AmpFISTR Identifiler kit (Applied Biosystems) In order to increase the chance of success with sample showing scarce and poor quality DNA ,we also analysed some MiniSTRs (according to NIST protocols) and subsequently 52 SNPs that permit the amplification of very short DNA regions surrounding the substitution site.

We observed that the combination between the right sample collection procedure, the high sensitivity of Charge Switch Technology for DNA extraction, the choice of an appropriate amplification procedure (LCN or not), permitted us to obtain good and reliable results.

CST modified procedure was able to purify efficiently trace amounts of DNA while at the same time removing potential inhibitors of PCR .

Obviously the analysis success is variable since it's possible that some people leave more DNA in their prints than others. However the ability to analyze DNA left onto objects or by a perpetrator on the skin of a victim provides a new tool for crime scene investigations.