

FORENSIC DNA ANALYSIS OF MATERIAL TRANSFERRED DURING PHYSICAL ASSAULT

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Introduction: It has previously been demonstrated that 'touch-DNA' can be recovered from animate and inanimate surface after skin contact has been made, with the level recovered varying greatly between individuals. Less work has been published to investigate the background levels of non-self DNA that can be recovered from animate and inanimate surfaces that is present due to normal everyday interactions. At the time of writing no work has been published detailing the amount of DNA that can be transferred by punch or slapping.

Aim & objectives: This study has been designed to determine if levels of DNA transferred during the acts of punching and slapping are above those observed normally due to innocent activity. To achieve this three phases will be completed. Phase I will compare DNA recovery of five commercially available extraction kits. Phase II will determine background levels of DNA on the hands of 10 volunteers, sampled 10 times each and Phase III will determine how much DNA is transferred by the same 10 volunteers after punching and slapping a DNA-free surface, 10 times for each assault type.

Methods: DNA was extracted using the QIAamp DNA mini kit and eluted in 50µl buffer AE, then quantified in duplicate using the Quantifiler Duo Quantification Kit. DNA profiling was carried out using the SGM Plus PCR Amplification kit under both standard (28 cycles) and Low Copy Number (34 cycles) amplification protocols, where necessary.

Results: The results obtained in Phase I revealed that the QIAamp DNA mini kit was the most reliable DNA extraction kit tested in our hands and was therefore used for the duration of the project. During Phase II it was revealed that a range of DNA quantity between 0.22 – 56ng was recovered from hand surface swabs giving a range of DNA profiles of the volunteers own DNA between 0-100%. The number of non-self DNA profile components also varied greatly between 0-20 alleles in each DNA profile during Phase II. The results of Phase III indicated that relatively low levels of DNA are transferred to the punched or slapped surface after a single contact is made with the maximum quantity recovered being only 2.2ng after a punch and 1.2ng after a slap. DNA profiling of these samples revealed that the perpetrators DNA could not always be detected and that non-perpetrator alleles were present in some samples, which could interfere with the identification of the true perpetrator of a physical assault.

Conclusion: Non-self DNA profile components can regularly be observed on the skin surface of healthy adult volunteers and this non-self DNA can be transferred during physical assaults, potentially confusing DNA recovered from punched or slapped areas during criminal investigations.