B113 DNA Transfer Through Forceful Contact

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After attending this presentation, attendees will find out whether offender DNA can be detected in sites of forceful contact and how the profiles observed vary between different types of force. This may be an important tool in those investigating physical abuse in men, women and children.

This presentation will impact the forensic community and/or humanity by indicating whether it is possible to identify the perpetrator of physical abuse or rape by swabbing areas of known forceful contact for offender DNA.

Hypothesis: DNA will be deposited on an individual's skin when punched, slapped, or gripped, although the quantity/quality will vary depending on the force applied. DNA from the 'victim' will also be observed on the hand of the donor.

The British Crime Survey of 2001 found that approximately 45% of women and 26% of men aged 16 to 59 had experienced at least one incident of inter-personal violence in their lifetimes. In Britain every year three million children are victims of abuse. Many victims are too terrified to tell the authorities what has happened, and without their testimony or the evidence of witnesses it may be impossible to identify the perpetrator and prosecute them.

A number of studies including those by van Oorschot *et al*. (1997), Lowe *et al*. (2002) and Ladd *et al*. (1999) have shown that it is possible to obtain a DNA profile from objects, touched even for only a few seconds. As yet, the only investigation into the transfer of DNA through forceful contact is that by Rutty (2002). This study showed that during simulated manual strangulation 7 out of 19 test swabs showed victim and offender DNA profiles, with the offender profile being observed up to 6 hours after contact. Twelve out of the 19 showed victim only DNA profiles. No other study, as yet, has investigated different forms of forceful contact. It is hypothesized, therefore, that when an individual hits another, some of the offender's DNA will be transferred onto that person's skin and vice versa.

A preliminary study has been performed to investigate the transfer of DNA between individuals during a punch, slap, and brief grip of the upper arm. Of the two individuals involved one was known to be a poor shedder, and the other a good shedder, but experiments were performed at least one hour after hand washing in order to minimize the effects of shedder status (Lowe *et al*. 2002). Prior to each contact the volunteer's arms and hands were swabbed as a control (the opposite ones to those involved in the contact). After the force was applied the hand of the donor was swabbed and the recipient's arm was also swabbed with a sterile moistened cotton swab. This was then repeated with the roles reversed. Each experiment was carried out with a punch, slap, or grip and each type of force was tested three times.

DNA was extracted from the swabs using the Qiagen QIAamp DNA mini kit (Qiagen Ltd, Sussex) and was quantified using the Nanodrop® ND 1000 spectrophotometer. DNA was amplified and analyzed using AmpF?STR? SGM Plus? PCR Amplification kit, ABI 3130 genetic analyzer, and Genemapper IDâ (Applied Biosystems, CA, USA).

After 28 cycles of PCR no non-donor alleles were observed, on the arm or hand of either volunteer. Thirty-four cycles of PCR did result in one or two spurious alleles but only one sample yielded a mixed profile. This sample was from the arm of one of the volunteers after being slapped and showed alleles from donor and recipient at multiple loci.

References:

1 van Oorschot, R.A. and Jones, M.K. (1997) *Nature*, **3**87, 767.

2 Ladd, C., Adamowicz, M.S., Bourke, M.T., Scherczinger, C.A. and Lee, H.C. (1999) *J Forensic Sci*, 44, 1270-1272.

3 Lowe, A., Murray, C., Whitaker, J., Tully, G. and Gill, P. (2002) *Forensic Sci Int*, 129, 25-34. Rutty, G.N. (2002) *Int J Legal Med*, 116, 170-173.

DNA, Force, Physical Abuse

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