



## DNA transfer through nonintimate social contact



S. Jones <sup>a,\*</sup>, K. Scott <sup>a</sup>, J. Lewis <sup>b</sup>, G. Davidson <sup>c</sup>, J.E. Allard <sup>d,1</sup>, C. Lowrie <sup>e,1</sup>, B.M. McBride <sup>f</sup>, L. McKenna <sup>f</sup>, G. Teppett <sup>g</sup>, C. Rogers <sup>h</sup>, N. Clayson <sup>i</sup>, A. Baird <sup>j,1</sup>

<sup>a</sup> SPA Forensic Services, Nelson Street, Aberdeen, Scotland AB24 5EQ, United Kingdom

<sup>b</sup> Cellmark Forensic Services, 16 Blacklands Way, Abingdon Business Park, Abingdon, Oxfordshire OX14 1DY, United Kingdom

<sup>c</sup> Cellmark Forensic Services, Unit B1, Buckshaw Link, Ordnance Road, Buckshaw Village, Chorley, Lancashire PR7 7EL, United Kingdom

<sup>d</sup> Forensic Science Service Ltd, 109 Lambeth Road, London SE1 7LP, United Kingdom <sup>1</sup>

<sup>e</sup> LGC Forensics, Building 3, Drayton Manor Business Park, Coleshill Road, Tamworth B78 3GL, United Kingdom

<sup>f</sup> Forensic Science Laboratory, Garda Headquarters, Phoenix Park, Dublin 8, Ireland

<sup>g</sup> SPA Forensic Services, Rushton Court, 3 West Victoria Dock Road, Dundee, Scotland DD1 3JT, United Kingdom

<sup>h</sup> SPA Forensic Services, Pitt Street, Glasgow, Scotland G2 4JS, United Kingdom

<sup>i</sup> SPA Forensic Services, 11 Howden Hall Road, Edinburgh, Scotland EH16 6TF, United Kingdom

<sup>j</sup> Forensic Science Northern Ireland, 151 Belfast Road, Carrickfergus, County Antrim, Northern Ireland BT38 8PL, United Kingdom

### ARTICLE INFO

#### Article history:

Received 20 February 2014

Received in revised form 23 October 2015

Accepted 30 October 2015

#### Keywords:

Body fluid forum  
DNA transfer  
Social contact  
Sexual intercourse

### ABSTRACT

The UK and Ireland Association of Forensic Science Providers' (AFSP) Body Fluid Forum (BFF) set out to assist in the interpretation of sexual offence cases where semen is absent on vaginal swabs but female DNA is present on penile swabs or male underwear, and the issue to be addressed is whether or not sexual intercourse occurred. This study aims to investigate the frequency and amount of female DNA transferred to the penis and underwear of males following staged nonintimate social contact with females and to compare the findings with the amount of female DNA transferred to the penis and subsequently to the underwear of a male who had engaged in unprotected sexual intercourse with a female. In this study, no matching female DNA was detected on the inside front of the 44 items of male underwear used in this research following staged contact of a nonintimate nature and subsequent secondary transfer to the penis. After sexual intercourse, full profiles matching the female participant were found on the inside front of the males underwear with maximum peak heights in the range between 1898 and 3157 rfu. It was possible to demonstrate that DNA can occasionally transfer to the waistband and outside front of underwear worn by a male following staged nonintimate social contact. Data obtained in this study suggest that a matching female DNA profile below a peak height of 1000 rfu on the waistband of a male's underwear might be explained by nonintimate social contact with secondary transfer of female DNA from the male's hands.

© 2015 The Chartered Society of Forensic Sciences. Published by Elsevier Ireland Ltd. All rights reserved.

### 1. Background

Forensic science has long since had an important role in the investigation of sexual offences. The identification of semen on intimate swabs taken from the complainant, together with DNA analysis to establish the possible source, has proven invaluable in such cases. Often the scientist is also asked to evaluate the findings and give an opinion of the significance of the results in light of the prosecution and defence accounts. Where the issue to be addressed relates to whether or not sexual intercourse occurred at a particular time, then the presence of semen on intimate swabs can often provide support for an assertion that sexual intercourse did take place. However, how do we address the issue of whether sexual intercourse has occurred if no semen is found on the intimate swabs taken from the complainant? The member organisations

of the Association of Forensic Science Providers Body Fluid Forum have casework data which shows that semen is found in around 35% of submitted sexual offence cases with intimate swabs each year [2,3]. Advances in forensic science have led to increased sensitivity in DNA analysis; it is now routine practice to obtain DNA profiles from surfaces and objects which have merely been touched or handled [4]. This together with improved methods for DNA recovery from fabric surfaces [5] has given forensic practitioners greater opportunity to investigate sexual offences in the absence of semen on intimate swabs by examining penile swabs and male underpants for the presence of female DNA. Finding female DNA on such exhibits from a male suspect who denies having had any contact with the female can show a possible link between these individuals. However, it is possible for a person's DNA to be detected on surfaces when that person has not had direct contact with the item or individual. In these circumstances, their DNA may have been transferred via an intermediary surface (secondary or multiple transfers) such as someone else's hands [6,7]. Given this, in those allegations where the complainant and suspect are known to have been in

\* Corresponding author.

E-mail address: [sarah.jones@spa.pnn.police.uk](mailto:sarah.jones@spa.pnn.police.uk) (S. Jones).

<sup>1</sup> Formerly.

contact with each other prior to the alleged incident, it is important to know whether or not findings support an allegation of sexual intercourse as opposed to nonintimate social contact.

The AFSP BFF has set out to investigate the frequency and amount of female DNA transfer to the penis and underwear of males following staged nonintimate social contact with females, and to compare the findings with the amount of female DNA transferred to the penis and underwear of a male following unprotected sexual intercourse with a female. These findings will assist in the interpretation of sexual offence cases where semen is absent on intimate swabs from the complainant and the issue to be addressed is whether or not sexual intercourse occurred.

## 2. Materials and methods

### 2.1. DNA transfer during nonintimate social contact—initial trial

Male participants took penile swabs from themselves following staged nonintimate social contact with a female and simulated urination, and the underwear the males were wearing at the time of the simulated urination was subsequently seized. DNA was recovered from the underwear, and DNA analysis of these samples together with DNA analysis of the penile swabs was carried out. The resulting DNA profiles were interpreted. This was an initial investigation to determine whether transfer and recovery could happen. As such, the conditions for this initial trial were set to maximise the chance of transfer and were not representative of the timescales encountered in casework. The underwear was not cross-linked.

The trial was carried out within eight BFF organisations. A total of ten male/female pairs completed the initial trial, and there were three repeats with each couple, giving a total of 30 data sets. The same male participant was used on two occasions with different females (9 males participated), and the same female participant was used on two occasions with different males (9 females participated). Male and female pairs were chosen on the basis of the least number of alleles shared and having had no recent intimate contact.

#### 2.1.1. Prior to contact

The male participant showered and redressed wearing a new pair of 100% cotton briefs with no front opening and his own normal outer clothing. Both the male and the female participants then washed their hands.

#### 2.1.2. Staged contact (primary transfer step)

The male participant touched the face of the female with his hands using a massaging motion over the cheeks and neck area for 2 min. The male and female participants then held hands continuously using a rubbing/massaging motion for 3 min. Throughout the 5 min of contact, the male and female spoke to each other. The female then left the room.

#### 2.1.3. Immediately after contact (secondary transfer step)

The male participant simulated urination for about 30 s by undoing his trousers and removing his penis from his underwear over the

**Table 1**

Male participant 1 and female participant 1 (initial trial)

Tables 1–7: results of underwear samples with female DNA detected.

Sample	No. of female alleles	Peak height of female alleles (rfu)	Max female peak height (rfu)	No. of unknown alleles
Waistband	6* (9 <sup>†</sup> )	72	289 (het)	0
		79		
		109		
		180		
		227		
		289		

\* Number of alleles attributable to the female only and not accounting for shared alleles with the male.

† Number of female alleles accounting for those shared with male.

**Table 2**

Male participant 1 and female participant 1 (initial trial).

Sample	No. of female alleles	Peak height of female alleles (rfu)	Max female peak height (rfu)	No. of unknown alleles
Waistband	11* (19 <sup>†</sup> )	56	766 (het)	6
		61		
		84		
		85		
		117		
		190		
		268		
		528		
		528		
		766		
		279		

\* Number of alleles attributable to the female only and not accounting for shared alleles with the male.

† Number of female alleles accounting for those shared with male.

waistband of the underwear. To maximise the likelihood of transfer, both hands were used to hold the penis before returning the penis back into the underwear and redressing. The male participant washed his hands and then walked around for a period of 5 min.

#### 2.1.4. Sample collection

Wearing gloves, the male volunteer removed his underwear and then swabbed the shaft of his penis using a wet sterile cotton swab (moistened with deionised water) followed by a dry sterile cotton swab. The penile swabs were then frozen until they were submitted for DNA testing. The male participant put his underwear into a self-seal plastic bag, and this was then stored at room temperature until the underwear was sampled.

Sampling of the underwear and the subsequent DNA analysis was carried out by different scientists from those involved in the transfer experiments. The following five separate areas of the underwear were sampled for DNA analysis in laboratory conditions using mini-taping [5], applying the tape repeatedly to the surface of the underwear to ensure each entire area was sampled:

- Front waistband (inside and outside)
- Inside front panel
- Outside front panel
- Back inside
- Back outside

### 2.2. DNA transfer during nonintimate social contact—6-h time delay

Male participants took penile swabs from themselves following staged nonintimate social contact with a female and simulated urination, and the underwear that the males were wearing at the time was subsequently seized. In order to mimic a more realistic casework

**Table 3**

Male participant 1 and female participant 1 (initial trial).

Sample	No. of female alleles	Peak height of female alleles (rfu)	Max female peak height (rfu)	No. of unknown alleles
Waistband	5* (9 <sup>†</sup> )	92	180 (het)	1
		100		
		113		
		141		
		180		
		180		

\* Number of alleles attributable to the female only and not accounting for shared alleles with the male.

† Number of female alleles accounting for those shared with male.

Download English Version:

<https://daneshyari.com/en/article/106883>

Download Persian Version:

<https://daneshyari.com/article/106883>

[Daneshyari.com](https://daneshyari.com)