Science and Justice 50 (2010) 100–109

Contents lists available at ScienceDirect

Science and Justice

journal homepage: www.elsevier.com/locate/scijus

Conference report

Body Fluids Conference Jointly hosted by the Forensic Science Society & the Centre for Forensic Investigation, University of Teesside 18–19 April 2008 Convenors: Julie Allard and Brian Rankin

The conference was opened by Louise McKenna, Forensic Science Providers' Group (FSPG), Body Fluids Forum (BFF) Chair and Brian Rankin, President of the Forensic Science Society (FSSoc). The purpose of the conference was to share the Forum's knowledge with other forensic biologists and to learn from each other through discussion groups and poster presentations. A wide range and first-rate calibre of speakers from the UK, Ireland, New Zealand, Lausanne, Zurich and The Netherlands presented their work and findings over two days.

The BFF of the UK and Ireland was established in 2003 to join knowledge and experiences from various laboratories in order to optimise the location, recovery and identification of body fluids and best practice in the interpretation of the forensic results within the case context. The BFF then became a sub-group of the FSPG in 2006. Since its inception, members of the BFF have consolidated information and conducted much research into specific body-fluid matters.

This conference proved to be an impressive start in redressing the imbalance between the resources and attention that have been put into DNA profiling in recent years over and above the efforts put into improving the abilities of biologists to locate, extract and identify body fluids and into understanding the factors involved in their transfer and persistence.

And in the beginning.....there was AP

Gerry Davidson, FSPG BFF Secretary, Forensic Science Service (Chorley), and Jennie Lewis, FSPG BFF Member, Cellmark Forensic Services

This presentation detailed the BFF's approach to maximising the chances of finding relevant evidence in sexual offence casework and improving the value of forensic science. Gerry and Jennie addressed issues relating to the use of the acid phosphatase (AP) test, an initial screening test for the presence of semen. Given that only an estimated 20% of rape cases are reported and of those, only 20% arrive at a forensic provider for work (2001 British Crime Survey) it is clearly of paramount importance to maximise the chances of finding relevant evidence in each case.

The AP screening test detects the presence of a substance found at especially high levels in human semen, acid phosphatase. The primary obstacle with the use of this test in forensic investigation is that vaginal material itself can contain some AP activity and, although this usually gives a slightly different reaction in the test, it can on occasion be confused with what might be expected from semen in trace amounts. The AP test used by forensic laboratories is used practically as it was when it was first described by Stuart Kind 50 years ago, although there are a number of variations on the theme. Typically this would involve dampened paper applied to the item of interest, pressure applied, resulting in the transfer of water and semen (if present) to the paper and then the application of AP.

In the research conducted by BFF members, many different parameters were investigated including how long the reaction may take, the strength of the reaction, the paper used, the quantity of water and direct application of the reagent to items. One member of the BFF conducted a literature search on cut-off times for AP reactions and found that only one paper had been published which suggested that if there had been no reaction after 2 min then the test should be regarded as negative. However, there appeared to be no mention of why this specific time was selected. This resulted in the decision that reaction times would be a wholly worthwhile variable to look into. The type of paper used was also investigated. Papers tested included Ford's Gold Medal Blotting Paper, Whatman No.1 Qualitative Filter Paper, Whatman Grades 1 and 3 Filter Papers and Banner Blotting Paper. Items tested were seeded with previously frozen semen. The tests showed that there was not a great deal of difference in the papers at 2 min and between 5 and 10 min. What was established is that the longer the AP is left to react, the greater the dilution of semen that is detectable. After several hours, faint purple reactions and purple speck reactions were obtained. At 4 h it was possible to detect a 1-in-1000 dilution on Whatman Grade 3 Filter Paper. Some of the findings from these studies have meant that many BFF laboratories no longer have a two-minute cut-off point.

Another variable considered in the experimental studies was the amount of water used to dampen the items under test and which items should be dampened: to wet the paper, to wet the exhibit or to wet both? These tests involved trying out variations on 32 different types of fabric, including a cotton facecloth, poly/cotton t-shirt, polyester fleece, carpet, suede jacket, wool sweater, double layer cotton knickers, elastane top, polyester skirt, and a corduroy skirt. In general, the reactions seemed to be quicker when the 'exhibits' and blotting papers were wet but semen was still detected when the wet/dry methods were tested. There were no definitive conclusions relating to whether fabric type is likely to affect the results.

Some recommendations included considering the specific circumstances of the case in question, assessing expectations, gathering information, consideration of the fabric type, approach to search and recovery, time since deposition, time to deposition (for vaginal drainage stains) and potential for primary and/or secondary transfer.

In another series of tests, fresh semen at a series of dilutions was seeded on pairs of knickers which were then placed in bags and put in a cupboard for a week. These were then tested for AP using the blot method, a spray method and direct aerosol application of the reagent.

doi:10.1016/j.scijus.2009.12.003

and persistence of DNA and what is the current published knowledge in this area", or "Find out what size the t-shirt is and comment on whether it could have been worn backwards".

The duty of a forensic scientist is to the court, to address the issues on which they have been instructed, but also to advise if a particular weakness is identified. It is not to provide or suggest a defence but to inform about the limitations of the tests undertaken. Dr. Davey considers the role of a 'defence scientist' to be exactly the same as that of a scientist who has examined the casework first, with the single distinction being that there is often a different version of events to consider.

Acquiring complete information, including the version of events from the defendant is often very difficult, and is not always followed up. The seeking out of information is crucial to any investigation in order that meaningful conclusions can be drawn from any forensic findings. The frequency of the "no comment" interview, which seems to be the advice of most legal representatives, is unhelpful. It hinders the process of robust interpretation of results. Unfortunately, the current drivers of cost reductions and decreasing casework turn-around times in the forensic marketplace are acting against good practice. It can result in quick-fix solutions to prove a prosecution case rather than an investigation of both versions. The obvious dilemma here is that injustices work both ways. Failure to convict the guilty is equally as dreadful as failure to acquit the innocent.

In one casework example, Dr. Davey reported a sexual offence case that had two very clear alternative propositions, but where the defence alternative was not investigated. A girl alleged that she was raped on a sofa by a male friend in his house. Relevant medical samples and clothing were taken during a forensic medical examination. The defendant's version of events was that he claimed to have had consensual vaginal intercourse with the girl and that he had had occasional sex with her over a nine-month period on the bed in his home. The bed sheets were not retrieved. Later in the case, the mattress was recovered from the man's home and was examined by Dr. Davey's laboratory. Twenty-one areas of body fluid staining were detected and these were submitted for DNA profiling resulting in mixtures of DNA from the defendant and the complainant. This previous sexual history became the distinguishing factor between their accounts. Dr. Davey felt that in this case the onus was on the suspect to prove his innocence.

There also appears to be a large disparity between the ways in which information contained in forensic reports is used. Prosecution reports are fully disclosed and used in the case, and contain details of unused materials. In contrast, defence reports are only sometimes disclosed and are used for cross-examination and as leverage to encourage a plea. Ultimately, the fate of the report in relation to disclosure is out of the experts' hands.

To conclude the presentation, Dr. Davey invited opinions from the audience as to whether there is a role for a new professional body to regulate these direct and seemingly irresolvable conflicts presented by the system in which forensic scientists work.

The transfer of DNA through non-intimate, social contact

Sarah Jones, FSPG BFF Member and Kirsty Scott, SPSA Forensic Services (Aberdeen)

Can DNA end up on a penis through non-intimate social contact? It is well documented in the literature that the potential for low levels of DNA to be deposited by contact presents the uncertainty of *how* it got there. It is entirely possible for secondary, even tertiary, transfer (to underwear for example) of DNA to occur where a defendant and complainant have had legitimate contact. However, the issue remains to what extent transfer of DNA can occur in this manner. The possibility of this type of transfer creates tricky interpretational problems in, for example, allegations of rape where the evidence comprises DNA that matches to that of the complainant on the accused's penile swabs and/or underwear, and where the two parties were in each other's company prior to the alleged incident.

The lack of research and literature in this area to demonstrate what might be expected to transfer through non-intimate social contact as opposed to as a result of sexual activity was the principal trigger for this research project, which started three years ago. The aim of the project is to investigate the extent to which DNA may transfer 'innocently' in order to provide reporting officers with some valuable information when evaluating alleged rape cases where the complainant and accused have spent time in each other's company preceding the said event.

Experiments included a male and female volunteer who were asked to simulate non-intimate social contact and the amount of female DNA detected on the male's underpants and penile swabs was then scrutinized. During the experiments, social contact was simulated under varied conditions and female volunteers were selected after their shedder status had been observed. A shedder and a non-shedder were selected. Prior to the social contact the male was asked to shower, dress in a brand new pair of underpants and normal clothes. Both male and female volunteers washed their hands prior to the contact, then following the contact the male simulated urination and continued to wear the underpants for another 5 min. Here are some examples of the experiments:

1) min of face-touching, 3 min of handholding and immediate urination.
2) 2 min of face-touching, 3 min of handholding then urination after fifteen minutes.
3) 1 min of handholding then immediate urination.

Following the experiments, the male volunteer's penis (shaft) was swabbed using a damp then a dry swab and these were combined for analysis. The front inside, front outside, back inside and waistband of the underpants were also sampled for evidence of DNA transfer. In scenario one, as above, 33% of the underwear sampled indicated transfer of female DNA (50% exhibited 15+ alleles). 67% of the penile swabs demonstrated transfer of female DNA (1–5 alleles). On the samples taken from the inside front of the underwear there were two mixed profiles out of six samples with the male being the major component and at least two people in the minor. The female could not be eliminated from the minor. The results were the same from the outside front of the underwear samples. On four out of six of the penile swabs, the major profile came from the male with a minor matching the female.

In scenario two, as above, all the DNA profiles detected had a major male and the female volunteer was not detected on any samples from the underwear or penis. In scenario three, as detailed above, again no female DNA was detected. From the underwear, a large amount of unknown DNA was also detected, so in later experiments the underwear was UV cross-linked to remove any contamination. A repeat of the first experiment was carried out using a different male volunteer and this time there was no evidence of transfer of female DNA.

These early results showed that transfer of DNA through non-intimate social contact can occur, but only when the conditions such as the nature and length of time of contact, time delays, and shedder status, are maximised. When more realistic social scenarios were simulated, the female's DNA was not detected on the underwear or penile swabs. There is much further work to do, but this has at least provided a good basis on which to continue work.

Discussion groups

Medical examinations — can we improve the collection of samples and the interaction between medical practitioners and scientists?

Facilitated by Dr. Debbi Rogers, Mary Newton, Anne Baird, and Gwen Teppett

Forensic sampling by Forensic Physicians is largely steered by the contents of medical kits and any associated instructions or training