

# Current Shortfalls in the Interpretation of DNA Results

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**D**evelopments in DNA profiling have seen significant increases in the sensitivity and discriminating power of the DNA testing systems used routinely in criminal case work. This means that DNA profiles can now be generated from the tiniest trace of DNA, and such results can have an almost overpowering numerical strength associated with them.

The increase in sensitivity is a double edged sword, in that it allows the detection of infinitesimally small amounts of DNA, but also means that most results now seen are mixtures of DNA from more than one source, which require more involved, time-consuming interpretation, as well as careful consideration in the context of the case circumstances, to determine whether the result is significant or not.

DNA is almost ubiquitous in the human environment as a result of people shedding their DNA in the form of skin

flakes, small droplets of saliva ejected from the mouth or dandruff falling from the scalp, for example. In a home environment, other body fluids such as semen may be present on surfaces such as bedding or items of clothing. Once shed from the body, this DNA-containing cellular material can be re-distributed to surfaces other than that on which it was first deposited. If, for example, a well-worn item of clothing is moved or shaken, the DNA of the habitual wearer, in the form of skin flakes or flakes of dried body fluid, may become detached and re-deposited on any surfaces in the vicinity. This form of DNA deposition is termed 'secondary' or 'indirect' transfer of DNA.

When interpreting DNA evidence, there are two main considerations:

1. Who the DNA came from – i.e. the DNA “match”, and
2. How the DNA was deposited, and hence its relevance to the crime under investigation.

It is our experience that the numerical match probability or likelihood ratio (LR) derived in addressing the first question is often conflated with the activity level interpretation that is addressed in the second question. Such a logic error has the potential to overstate the significance of the finding, and perhaps be misunderstood by the triers of fact.

When DNA attributable to a defendant is found on an item such as a weapon, or on the skin of a person they are said to have assaulted, but the weapon has been found in a place they are known to frequent or they and the complainant are known to each other, careful consideration needs to be given to how the DNA may have been transferred.

In domestic situations, where the complainant and defendant share the same living environment, or there has been accepted legitimate contact between the two individuals beyond that involved in the alleged crime, the transfer of DNA between these individuals might reasonably be expected. The same applies to items such as drugs or weapons found in the defendant's living space. In such cases, the DNA statistic may be almost worthless, as a DNA match is perhaps not unexpected. What undoubtedly is more important is that the amount of DNA that has been transferred is considered in the framework of where the sample was collected from and the specifics of the allegation. Increasingly, however, Crown forensic statements provide only a numerical significance for the DNA match and provide no interpretation in the case circumstances.

The most abbreviated form of reporting in this regard is the Streamlined Forensic DNA Match Report (or SFR1). Such reports are computer generated by Police forces in response to a "hit" on the National DNA Database. These reports have the veneer of a scientific report, but in reality, there is no direct input from a scientist in their generation and hence no consideration of DNA transfer and persistence issues will have taken place.

Examining the results of the DNA analysis and obtaining the quantitation values in which the amount of DNA in the sample has been measured, can provide useful information when considering whether the material tested has come from a body fluid, and if a mixture, the relative proportions of each contributor's DNA. In this way, full consideration can be given to the **probative value** of the DNA evidence as a whole rather than just the **potential source** of the DNA.

It is our view that if there are alternative opportunities for DNA transfer, other than the perpetration of the alleged crime, then a review of the evidence is warranted.

#### Case Example

*In an Operation Trident case, the defendant was charged with Possession of a Firearm. An SFR1 was presented with the intention of it being relied on in Court. This report*

*indicated that DNA matching that of the defendant, with a match probability of one in one hundred million, was found on a firearm that was recovered from the defendant's home, a property frequented by many individuals. The finding was intended to be relied on as support for the defendant having handled the gun.*

*A review of all of the DNA analytical results undertaken on this item, and the circumstances in which the gun was found, revealed that relatively high levels of DNA attributable to the defendant were present in a sample from the outside surface of a sock that had been covering the gun. What was not mentioned was that there was also DNA from probably six or more people also present at a lower level in the sample. Furthermore, a high level of DNA from an unidentified male was found on the string used to secure the sock around the gun. The gun had been recovered from under a mattress in the man's home. It was our expert opinion that, while handling could have been the activity leading to the deposition of the recovered DNA, the recovery of the gun from under a mattress in his home, where high levels of his DNA could have accrued, presented a realistic possibility for acquisition of his DNA not requiring his direct contact with the sock-covered gun.*

In this case, reliance by the Crown on the Streamlined Forensic Report was, in our view, significantly misleading by omission, as it did not give any indication that:

- multiple sources of DNA had been detected
- a high level DNA profile not matching any of the nominated suspects was found on the string used to secure the sock around the gun
- the presence of the item in the man's home could, in and of itself, have been responsible for the DNA result.

With examples of secondary transfer issues like this not uncommon in case work, prosecuting and defending counsel should be aware of what the SFR1 may not be disclosing.

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