

Ethics watch

LCN DNA: PROOF BEYOND REASONABLE DOUBT?

Low copy number (LCN) DNA forensic profiling has led to successful criminal prosecutions, including in the Peter Falconio case in Australia and the murder of the Swedish foreign minister, Anna Lindh. However, the technique has serious limitations, and few jurisdictions have followed the United Kingdom in accepting it as evidence in court. The discrediting of the LCN DNA evidence in the Omagh trial, which led the UK police to temporarily suspend their use of the method, has prompted further questioning of this technique and some scientists are claiming that criminal convictions based upon LCN DNA will soon start troubling the appeal courts.

A method for profiling LCN DNA — often referred to as ‘trace DNA’ or ‘touch DNA’ — was developed in 1997 to provide a DNA profile from forensic samples that are so small (<100 pg) they could have been left by a mere touch. This is achieved by increasing the number of PCR cycles from 28 to 34.

From the outset, difficulties with the LCN DNA technique were reported, including concerns about the increased risks of contamination and transference¹, about allelic drop-out and drop-in as well as artefacts. Such phenomena increase the chance of false positives: adventitious matches with innocent individuals. These limitations, and the time-consuming nature and costliness of the process, mean that few jurisdictions have followed the United Kingdom in using the technique. In the United States, it is used exclusively as a last resort to narrow a large pool of suspects, and can only be used as intelligence — that is, information to assist an investigation — rather than evidence at trial. This is partly because LCN DNA profiling has not been standardized, so different laboratories could produce differing results.

In the recent Omagh trial, the prosecution relied upon LCN DNA to link Sean Hoey with a series of bombings in Northern Ireland. The defence, however, were able to demonstrate that the collection and storage of exhibits had not been undertaken with due diligence. Collection of crime-scene materials had been done without what would now be considered standard protective clothing, and there were many instances of confusion over who had collected, and what had been done to, the exhibits. The judge summarized the

approach as “thoughtless and slapdash ... items were so widely and routinely handled with cavalier disregard for their integrity”, leading him to conclude “...I find that the DNA evidence ... cannot satisfy me either beyond a reasonable doubt or to any other acceptable standard.”²

More importantly, however, the judge went on to cast doubt over the reliability of the LCN DNA technique, commenting that he was concerned at the wide variance of expert opinion and pointing out that LCN DNA has only been adopted for evidential purposes in two other countries. Moreover, the lack of validation of the LCN DNA technique prevented calculations of the degree of reliability of the results; in the Omagh case the testing process had given differing results, demonstrating its potential to mislead.

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Following the ruling, the UK police immediately announced a suspension of the use of LCN DNA to enable a review of all pending prosecutions involving LCN DNA evidence. This was concluded on 14 January 2008, with the release of a statement that affirmed that there were no problems with LCN DNA evidence and that it could continue to be used in prosecutions. The review produced questions that a prosecutor should ask before relying upon LCN DNA, which would: interrogate the professional standing of the forensic scientist involved; establish the integrity of the exhibits and the risk of contamination; ask why LCN DNA was used; determine how the results had been interpreted and whether there were any composite results; and identify any potential issues or weaknesses. In addition, a scientific review of the LCN technique is due soon and is widely anticipated to conclude that the technique is reliable, while recommending common standards and practices for its uses.



However, was this response to the Omagh verdict too quick? Taking just 3 weeks (over the Christmas and New Year holidays), the review did not look into convictions that had already been secured using LCN DNA. These cases could find their way to the appeal courts on the basis of similar problems to those found in the Omagh case. So, although LCN DNA must surely come under further judicial scrutiny, none of the aforementioned difficulties have been overcome — in fact, the scientific community remain as far from a consensus on LCN DNA as ever and, as such, it cannot be considered an accepted scientific technique. Why have other countries not seized upon this development in DNA profiling, including the well-resourced FBI? Are we to believe the suggestion that, one decade on, they are simply struggling to catch up?

The United Kingdom’s recently appointed forensic regulator might yet act, but courts in all jurisdictions will still need to take precautions against admitting unreliable scientific evidence. There remains an important difference between what can be reported in scientific literature and what should be used as evidence. All forensic evidence must be intelligible to the courts and subject by them, rather than by scientists, to exactly the same standard of proof as other forms of evidence: proof beyond reasonable doubt. Previous miscarriages of justice have highlighted how flawed or misinterpreted science can have dire consequences, and we should not be so swayed by any DNA technique that we fail to properly scrutinize its integrity; forensic scientists may be getting cleverer but they are not yet infallible. Moreover, corroboration with non-scientific evidence is never a sufficient answer to bolster flawed scientific evidence. LCN DNA might prove to have some value in criminal investigations, but it has not yet reached the required standard for use as evidence.

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REFERENCES ¹Lowe, A., Murray, C., Whitaker, J., Tully, G & Gill, P. The propensity of individuals to deposit DNA and secondary transfer of low level DNA from individuals to inert surfaces. *Forensic Sci. Int.* **129**, 25–34 (2002) | ²R v Hoey [2007] NICC 49 (para 61) [online] <<http://www.xproexperts.co.uk/newsletters/feb08/R%20v%20Hoey.pdf>>