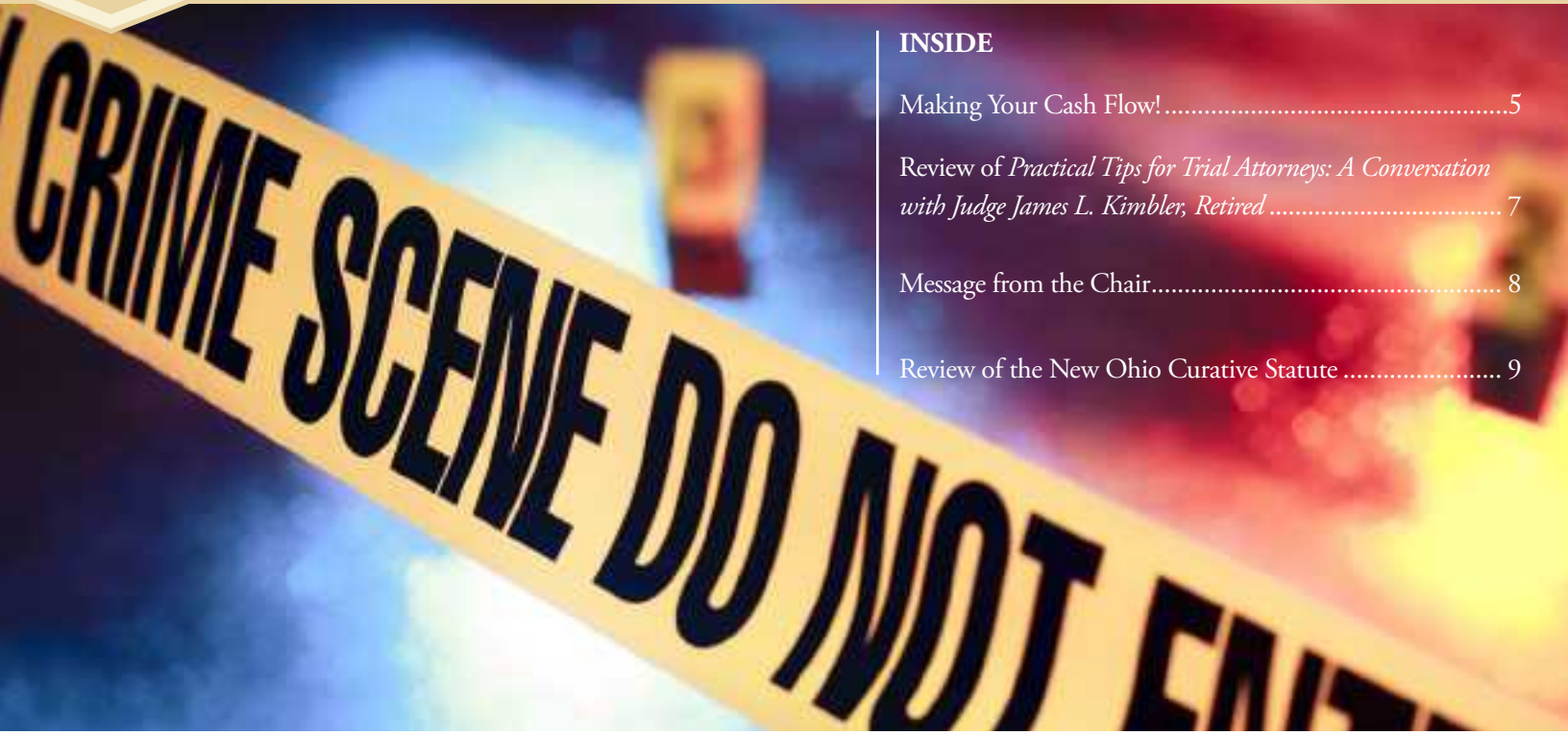
Vol. 31 Issue 1
Published by the Ohio State Bar Association
Solo, Small Firms and General Practice Section

Solo, Small Firms and General Practice News



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Is "Touch DNA" Precisely the Opposite?

By Joseph R. Klammer, Esq.

In even routine criminal cases, prosecutors are now using "touch DNA" as powerful evidence. The science and technology behind the "touch DNA" phenomenon deserve careful examination. In less than a decade and despite countless prosecutions which relied in whole or in part on "touch DNA," the principles underpinning the "touch DNA" concept should now be called into question.

From the outset, DNA lab technicians surely understood that reference to "touch DNA," like the phrase "DNA fingerprints," is inappropriate. Nonetheless, it quickly became a part of forensics and prosecution lexicon. The term should never find its way into a courtroom. As Georgina Meakin and Allan Jamieson explained in their 2012 article "DNA Transfer: Review and Implications in Casework" as published in *Forensic Science International: Genetics:*

> Several different terms have been coined to describe such DNA. For example, the term 'touch DNA' has been used, but this can be misleading in two ways: Firstly, such a term infers that the DNA recovered from a surface got there via that surface being touched, but this is usually not known, and secondly, there is a misconception that 'touch DNA' can only be detected by LT-DNA techniques.[1]

And, replacing "touch DNA" with "trace DNA" does little to clarify what is the evidence. Meakin and Jamieson further explain that "[t]he term 'trace DNA' is now gaining more usage over 'touch DNA', but can have various meanings; it could refer to the amount of DNA present, the quality of DNA present, or to DNA detected by a LT-DNA technique."[2] The misleading nature of both of these terms is a real danger. But, "touch evidence" can sway decision makers to believe that any DNA

(continued on pg. 2)

“Direct, or primary, transfer includes contact, but also includes activities within the vicinity of an item that may result in the transfer of DNA directly from an individual without any contact, such as speaking, coughing, and sneezing.”

recovered was present because the accused actually handled and “touched” the evidence.

While less than 10 years ago, technicians believed that the DNA evidence was present because the depositor handled the evidence, studies have now shown that to be incorrect. For instance, even merely talking near an item is enough to leave DNA evidence. Meakin and Jamieson explain:

> DNA-bearing cellular material can come to be present on a surface by either direct or indirect transfer. Direct, or primary, transfer includes contact, but also includes activities within the vicinity of an item that may result in the transfer of DNA directly from an individual without any contact, such as speaking, coughing, and sneezing. Due to the known presence of DNA in saliva and nasal mucous, it is believed that these activities result in the transfer of DNA, although very little research has been published on the subject.[3]

While there is not yet extensive research on the extent to which there can be direct transfer of DNA without contact, the research that has been completed is alarming. For instance:

> The available work demonstrates that the quality of DNA profiles recovered reduced with greater distances from the speaking/coughing individual. It was also shown that speaking whilst sitting, kneeling, or standing on the floor could result in full DNA profiles from the individual being detected on the floor up to approximately half a metre away within 2–30 s, and that the longer the individual spoke for, the greater the distance from which full DNA profiles could be recovered.

Not only does the longer one speaks extend the distance upon which the DNA evidence can be recovered, but the traditional assumption that more DNA equates to the length of the encounter also appears to be incorrect. While:

> It is often asserted, on the basis of the amount recovered, that the DNA was deposited through regular contact rather than a single contact. *** Overall, it has been demonstrated that the amount of DNA recovered from an item that has been touched once varies widely (Table 1), roughly in the region of 0– 150 ng, depending on the factors involved. *Therefore, it is possible for a person to touch an item once and leave no detectable DNA, or leave a relatively large amount of DNA (given that as little as 0.2 ng of DNA can produce a good quality DNA profile by standard methods).*[4]

If this were not alarming enough, the misuse of “touch DNA” is incredibly dangerous when an officer, a prosecutor, a DNA technician, a judge or a jury is unaware that there can be secondary transfer of DNA evidence. This concept of secondary transfer in this context is a unique intersection of the improvement of DNA forensics and the concept that calls into question whether a person actually interacted with the evidence.

In "Following the Transfer of DNA: How Does the Presence of Background DNA Affect the Transfer and Detection of Target Source DNA?" the authors discuss this dilemma. They explain:

> Because the analytical techniques used to detect DNA profiles are becoming more sensitive and discriminating, and can detect full DNA profiles from minute amounts of DNA, trace DNA is often useful in criminal investigations. Also, touch DNA from skin cells, by consequence of its origin, is often involved in contact situations, and is not always readily distinguishable from background sources and levels of DNA.[5]

Lehmann, *et al.* studied the effects of background DNA material on the transfer of the primary DNA material. They tested the transfer in the context of wet blood, dry blood and "touch DNA" using cotton and glass. The results are complicated but, in short, the testing demonstrated that multiple transfers with various background DNA configurations affected the results.
They concluded that:

> We have shown that the presence of a background source of DNA can alter the transfer of the target DNA. In situations where transfer was affected by background DNA, whether the transfer of the target DNA increased or decreased, depended on the combination of substrate and biological material. Detection of the target DNA was also influenced by the presence of a background source of DNA. However, this was only true for certain combinations of substrates and biological materials. The ability to detect a profile from the target DNA decreased after multiple contact situations, due to the target DNA becoming the minor component of the extract. The presence of several different sources of background DNA created mixed profiles and had major negative influences on the detection of the target source of DNA.[6]

Moreover, when looking at specific handled substrate, there are unexpected results. Daly, Murphy, and McDermott in their article "The Transfer of Touch DNA from Hands, Fabric and Wood" concluded that "[t]he amount of DNA transferred to a substrate during handling was found to be independent of handling time, dependent on the individual handler and dependent on the handled substrate." D.J. Daly, *et al.*, The transfer of touch DNA from hands to glass, fabric and wood, Forensic Sci. Int. Genet (2011), doi:10.1016/j.fsigen.2010.12.016. What is important to note from that conclusion is the amount of transfer was completely independent of handling time.

Because handling time was independent, why a specific item, say a weapon, was handled and for how long should remain debatable. And more important, one must examine whether the item was handled by someone with secondary transfer DNA. Here too, the research has reversed its thinking. Whereas in 2010, Daly, *et al.*, did note any secondary transfer of full DNA profiles, by 2016, the research confirmed that secondary DNA

transfer was noted in a majority of the items tested. Cale, Earll, Latham and Bush in their article "Could Secondary DNA Transfer Falsely Place Someone at the Scene of a Crime" tested this possibility.

Therein, Cale, *et al.*, tested the hypothesis that secondary transfer of a third person's DNA to a knife handle can happen by mere handshaking with the person who would later actual handle the knife. They used controlled and cleaned knives of smooth and textured blades and ensure that the secondary hands were controlled and cleaned as well. The handshaking occurred for two minutes to replicate other forms of intimate contact. Following the contact, the primary participant immediately handled the knife.

The results were staggering. Secondary transfer occurred on 17 of the 20 knives. In five samples, complete foreign alleles were discovered. Most concerning is that in five of 20 knives the secondary contributor was either the only DNA contributor or the major contributor "despite never coming into direct contact with the knives."[9]

The authors also noted the concern with these findings. The warned that:

> Observing a single-source profile or a major component deduced to a single source together with a discriminating statistical calculation could lead investigators to believe that the source of the DNA profile was the individual who directly handled the object and was the perpetrator of the crime. If these results were presented during a trial as forensic evidence, they would be difficult to dispute.[10]

Cale, *et al.*, specifically note what should be the concern for everyone involved in our criminal justice system, namely whether misunderstood evidence can cause a miscarriage of justice. Too often technical or scientific evidence is misunderstood by police, prosecutors, defense attorneys and judges. When these actors misunderstand the evidence, there is no reason to believe a jury will not also be misled. The lexicon and technology of this type of DNA must be truly understood and used carefully.

By Joseph Klammer, a partner at The Klammer Law Office Ltd. in Mentor

Endnotes

[1]G. Meakin, A. Jamieson, "DNA Transfer: Review and Implications for Casework," Forensic Sci. Int. Genet. (2013), http://dx.doi.org/10.1016/j.fsigen.2013.03.013.

[2]Id.

[3]Id.

[4]Id. (Emphasis added.)

[5] Lehmann, Mitchell, Ballantyne, and Van Oorschot, "Following the Transfer of DNA: How Does the Presence of Background DNA Affect the Transfer and Detection of Target Source DNA?," Forensic Sci. Int. Genet. (2015), http://www.fsigenetics.com/article/S1872-4973(15)30007-7/fulltext.

[6]Id.

[7]D.J. Daly, et al., The transfer of touch DNA from hands to glass, fabric and wood, Forensic Sci. Int. Genet (2011), doi:10.1016/j.fsigen.2010.12.016.

[8]J. Forensic Sci., Jan. 2016.

[9]Id.

[10]Id. (Emphasis added.)