



**Ricardo Federico**  
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"DNA is good but it doesn't deserve the golden standard reputation that many lawyers may have assigned to it."

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# An imprecise SCIENCE

**I**n 2003, Italian DNA evidence implicated an English bartender, Peter Hamkin, in the murder of Annalisa Vincenti, who had been killed in Tuscany the summer before. Based on that evidence, Hamkin was arrested in Liverpool, even though he had never been to Italy and had dozens of witnesses attesting to his whereabouts in England when the crime occurred.

But Hamkin's DNA was available in international police records, due to a drunk-driving conviction in 2001.

Despite the wealth of contradictory human and documentary evidence, the DNA test prevailed — until a second DNA test cleared Hamkin before his extradition hearing began. "I told the police who arrested me that I have never been to Italy and I could prove it but they just did not listen," Hamkin told the Liverpool Daily Post newspaper. "I felt like I was trapped in some kind of crazy film and told myself this could not be happening to me."

"I suspect that the original DNA sample was bungled," said Hamkin's solicitor Rex Makin in the same article. "It begs a lot of questions about the procedures surrounding the routine sampling of DNA and the conduct of police in accepting DNA file evidence."

Peter Hamkin's wrongful arrest is an extreme case of DNA testing gone wrong, but it is by no means the only example. In July 2008 in Australia, Russell John Gesah, 43, was charged with the 1984 killings of Margaret Tapp and her daughter Seana, age 9. His arrest was trumpeted as a victory, as Gesah and his family lived through hell until police withdrew the charges 16 days later. It seems that Gesah's DNA was located on unrelated evidence forensically examined on a lab table that was subsequently used to re-examine the Tapp murder evidence. Gesah's DNA was thus transferred to the Tapp evidence, conclusions were drawn, and a wrongful arrest followed.

**By James Careless**

*Photography by Paul Eekhoff*



**Leo Adler**

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# Une science imprécise

*Plusieurs raisons expliquent comment des tests d'ADN peuvent donner des résultats erronés. D'où la nécessité d'y porter un regard plus critique.*

**E**n 2003, une preuve par ADN a impliqué Peter Hamkin, un barman britannique, dans le meurtre d'Annalisa Vincenti, tuée en Toscane l'été précédent. Sur cette base, M. Hamkin a été arrêté à Liverpool, même s'il n'avait jamais mis les pieds en Italie et que des douzaines de personnes pouvaient témoigner sur ses allées et venues en Angleterre au moment où le crime a été commis.

L'ADN du suspect était disponible dans les registres policiers en raison d'une arrestation pour conduite en état d'ébriété, deux ans auparavant. Or, malgré l'abondance de preuve testimoniale et documentaire, on a donné préséance au test d'ADN... Jusqu'à ce qu'un second exonère Peter Hamkin, tout juste avant ses audiences d'extradition.

« Je me sentais pris au piège dans un rêve absurde », a-t-il raconté à un journaliste du Liverpool Daily Post.

Cette affaire est un exemple extrême de

test d'ADN qui tourne au vinaigre. Mais ce n'est pas le seul.

« Des 156 personnes condamnées par erreur identifiées par le Innocence Project (un groupe d'avocats qui utilise les tests d'ADN pour exonérer les innocents), trois d'entre elles ont été emprisonnées », précise Ricardo Federico, un avocat de Toronto et co-auteur de la *Federico and Rondinelli's DNA Netletter*.

« L'ADN, c'est bien, mais ça ne mérite pas la réputation de premier ordre que plusieurs avocats lui accordent. »

Il y a plusieurs raisons pour lesquelles certains tests d'ADN sont loin d'être infallibles. D'abord, leur précision varie en fonction de la grosseur de l'échantillon. Ensuite, les « chimères » — ces gens qui ont deux patrimoines génétiques — sont aussi susceptibles de brouiller les pistes.

Enfin, il est possible pour quelqu'un de déposer volontairement de l'ADN sur une scène de crime. La manière traditionnelle de

le faire est de recueillir un échantillon sur un mégot de cigarette ou un verre, par exemple. Mais selon un article du Globe and Mail de mars 2010, une compagnie israélienne, Nucleix, serait maintenant en mesure de la synthétiser. Un criminel pourrait donc impliquer un innocent uniquement à partir de cellules microscopiques.

À ces facteurs, s'ajoute celui de l'erreur humaine. Un exemple réel a été utilisé par la série télévisée CSI : celui du « fantôme de Heilbronn ». En raison de l'ADN retrouvé sur la scène d'une quarantaine de crimes commis en Autriche, en France et en Allemagne, les autorités européennes croyaient avoir affaire avec tueuse en série. Des analyses ont finalement découvert qu'elle appartenait à une employée d'une manufacture de tiges de coton, celles-là mêmes utilisées par les enquêteurs de police...

Dans ce contexte, que doivent faire les avocats? Pour ceux de la Couronne, leur responsabilité consiste à connaître et à présenter la preuve dans son intégralité, insiste le Dr John Wayne, analyste et chef du service de diagnostic moléculaire à l'université McMaster. Quant à ceux de la défense, « ils doivent obtenir l'aide d'un expert qualifié pour réviser ces tests et trouver les failles », dit l'expert. **N**

“Out of the 156 wrongfully convicted people identified by the Innocence Project (a lawyers' group that uses DNA testing to clear the innocent), three of them were imprisoned as the result of DNA test errors,” says Ricardo Federico, a Toronto lawyer and co-author of Federico and Rondinelli's DNA Netletter. “DNA is good but it doesn't deserve the golden standard reputation that many lawyers may have assigned to it. Some lawyers have said DNA stands for “Do Not Acquit.”

## The right stuff

In court and on television, DNA testing is typically portrayed as a foolproof method of identification that cannot be circumvented in any way. “When it comes to DNA evidence, we are all guilty of a certain degree of awe and critical blindness,” says Leo Adler, a criminal lawyer partner at Adler Bytensky Prutschi in Toronto. “It's the reverence that leads people not to question DNA evidence in particular, and forensic evidence in general. This is what allowed discredited pathologist Dr. Charles Smith to get away with what he did for so many years. People do see DNA testing as being an infallible gold standard.”

In reality, there are many reasons why specific DNA test results can be less than foolproof. Collectively, they explain why results should never be accepted at face value.

First, the accuracy of a DNA test depends on the amount

of DNA evidence (the sample) available for comparison. The less you have to work with, the more difficult it is to make an accurate analysis, especially if the sample is in some way compromised.

“With the exception of nuclear DNA analysis [...] no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source,” according to a 2009 report by the U.S. National Academies of Science (NAS). However, just as “a latent fingerprint that is badly smudged when found cannot be usefully saved, analyzed, or explained ... DNA tests performed on a contaminated or otherwise compromised sample cannot be used reliably to identify or eliminate an individual as the perpetrator of a crime.”

The recent discovery of genetic ‘chimeras’ — people with two distinct strands of DNA, with both strands not necessarily being detectable in all areas of their bodies — plays havoc with DNA testing's reputed infallibility. The DNA sample left by a chimera at a crime scene may not match the DNA taken from them in a forensic sample. If this happens, any DNA testing that is done will clear the chimera, even though they committed the crime.

What's more, according to a 2008 article published by

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**Dr. John Wayne**  
McMaster University, Hamilton

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*Scientific American*, one twin may have more copies of a given shared gene than the other twin. This results in a measurable genetic difference between the twins known as ‘copy number variants.’

Finally, it is possible for someone to plant DNA evidence at a crime scene. The old-fashioned way to do this is by harvesting a sample of the person’s DNA from a cigarette butt, drinking glass or other source. However, according to a March 2010 article by Kirk Makin in *The Globe and Mail*, “an Israeli company, Nucleix Ltd., [has recently] announced [that] it could synthesize DNA. The news raised the spectre of criminals framing innocent people starting with a couple of microscopic cells.”

### A tragedy of errors

The issues raised above are sufficient to show that DNA testing is not infallible. But factor in the human element, and the room for error becomes much, much bigger.

The first class of errors that can affect DNA test accuracy fall into the unintentional category, including poor testing procedures, contaminated equipment, lack of rigor in testing and reporting, and plain incompetence.

Cross-contamination of samples can happen, as the Gesah case illustrates. Another stunning example of this — subsequently fictionalized in a *CSI* episode — was the purported existence of the ‘Phantom of Heilbronn,’ whom European authorities initially believed to be a female serial killer, based on DNA samples that turned up in 40 different crime scenes in Austria, France and Germany. Analysts later discovered that the DNA belonged to the same worker at the factory that produced the cotton swabs used by police investigators.

Unfortunately, there are intentional errors too. Our society’s belief in infallible DNA testing makes it possible for lawyers to present self-serving subjective assertions as objective truths.

“DNA testing is not immune from unscientific presentation of results in court,” says Brandon Garrett, a professor of law at the University of Virginia School of Law. He has also completed a forthcoming book, *Convicting the Innocent*, which examines the first 250 DNA exonerations in the U.S. “Three of the first 250 DNA exonerations in the U.S. involved DNA tests that were botched in the laboratory or where results were not accurately reported in courtroom testimony.”

### The burden of responsibility

DNA testing is not perfect, but when appropriately used, it is highly useful for accurately assigning innocence and guilt.

So where does this leave Crown prosecutors and defence lawyers, given their adversarial positions in court?

For the Crown, their responsibility lies in presenting DNA evidence in full and with all its warts, says Dr. John Wayne, a top Canadian DNA analyst and head of the Molecular

Diagnostic Service of the Hamilton Regional Laboratory Medicine Program at McMaster University. “The Crown needs to know the exact strengths and weaknesses of their DNA evidence when they take it into court,” Dr. Wayne says. “They also need to know the downsides — in some cases DNA evidence can include many, many more people than just the presumed contributor due to widespread shared genetic traits — and to be prepared to quantify the actual weight of the evidence in court. And the defence should be aware that evidence that is not presented with a measure of its weight — i.e. its projected accuracy — likely has no weight at all.”

According to Brendan Crawley, a spokesman for the Ontario Ministry of the Attorney General, the Crown is sensitive to such concerns, and mindful of issues such as dual DNA chimeras and their impact on DNA test accuracy. “The Crown receives expert opinion evidence with respect to DNA testing where relevant to a prosecution, and would approach the reliability of the evidence with the same scrutiny as any scientific evidence it puts before the Court,” Crawley says. “Crown counsel must make every effort to ensure that any limitations identified by its expert witnesses are fully impressed upon the trier of fact.”

And what about defence lawyers? “Defence attorneys must make sure they get the whole DNA file during disclosure,” says Dr. Wayne. “Moreover, they need to get the help of qualified DNA experts to go over these tests, to look for flaws and shortcomings.”

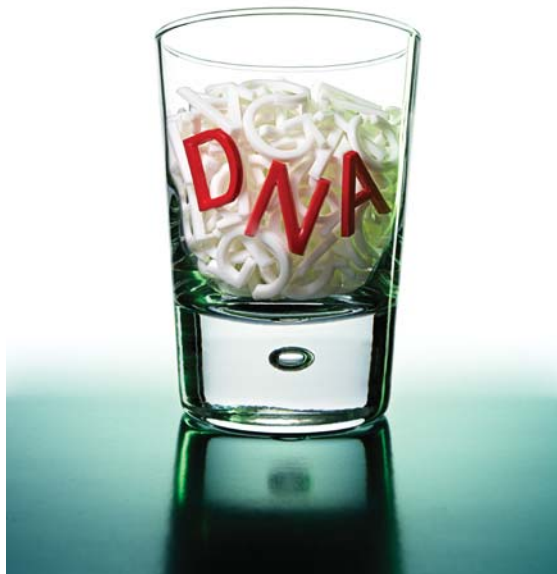
“When it comes to DNA cases,” says Federico, “I always retain accredited experts.”

Finally, defence lawyers should consider whether DNA testing is actually germane to their cases, says Adler. “In a case that I am defending, there is DNA evidence that my client had sex with the alleged victim,” he says. “But we are not disputing this point, so the DNA test doesn’t matter. What we are disputing is whether or not the sex was consensual. No DNA test can resolve that issue, no matter how accurate it is.”

What is overlooked is that issues associated with DNA testing often have little to do with actual science. Unintentional errors can creep in and affect the accuracy of a DNA sample under consideration. And misrepresentations regarding the accuracy and relevance of DNA in court are sometimes ignored.

That will hardly reassure critics, who argue that crime labs serve only to assist police and prosecutors, and not the accused. But there is an opportunity for prosecutors and defence lawyers to make sure that decisions of innocence and guilt are restored to judges and juries, in whose hands verdicts really belong. ■

James Careless is a freelance writer based in Ottawa.



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— Brendan Crawley, Ontario Ministry of the Attorney-General —