Speech by Secretary for Justice at 8th Ho Hung Chiu Lecture of Hong Kong College of Radiologists (English only)
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Following is the speech by the Secretary for Justice, Mr Wong Yan Lung, SC, at the 8th Ho Hung Chiu Lecture of Hong Kong College of Radiologists on "The Use of Medical Science in Criminal Trials – The Case for DNA Technology" today (October 27):

Dr Leong,

Introduction

Thank you for your kind words of introduction. Ladies and Gentlemen, it is my honour and pleasure to be among you this evening to deliver the 8th Ho Hung Chiu Lecture.

Professor Ho Hung Chiu, fondly known as "the Emperor", is a distinguished medical scientist who has made a major contribution to the fields of Radiology and Oncology and to the community. Not only did he advance his specialised field of medicine to new height, he also brought benefit to generations of patients though his legacy of combining science with humanity in clinical practice.

This evening, I would like to share with you my thoughts on the nexus between medicine and law by focusing on the use of medical science in criminal trials, and with particular emphasis on the case for DNA Technology. Because radiologists are generally well-behaved and have relatively few skirmishes with the law, it is hard to come up with a topic tailor-made for you.

Medical science has played an important role in the advancement of justice in criminal cases. As medical science has acquired greater knowledge and understanding of the human mind and body, so has our criminal justice system benefited in its pursuit of justice.

Law enforcement has turned to medical science, sometimes reluctantly, sometimes out of necessity, but always out of a desire to achieve justice. In criminal trials, it is necessary that we as lawyers have an acute understanding and appreciation of the particular field of medical science that we seek to rely on in a case. Equally, the experts in the field need to be even more accurate and sure about their subject, and to be able to explain it in its application to the case in clear and readily understandable terms.

The importance of medical science in criminal trials is best illustrated by the use of DNA technology. It has made its mark as the most significant advance in criminal investigation and prosecution since the advent of fingerprint identification. In many cases, as a result of DNA technology, the guilty have been convicted and the innocent have walked free.

Linus Pauling once said that “Science is the search for truth – it is not a game in which one tries to beat his opponent, to do harm to others.” Law is the search for justice by determining the truth.

To that end, it is instructive to examine how DNA technology has impacted on our criminal justice system and what initiatives we have taken or should take to better understand and utilise this important field of medical science in the administration of justice.

How it started

Forensic use of DNA technology in criminal cases began in the United Kingdom in 1986 in a case concerning the sexual assault and murder of two schoolgirls in a small town in Leicestershire in 1983 and 1986 respectively.

Semen samples taken from the bodies revealed that the assailant of each girl had the same blood type. The prime suspect was a local boy, who upon questioning by the police revealed previously unreleased details about the second girl’s body. He admitted the second murder but denied any involvement in the first murder. The police were convinced he committed the first murder and they sought the assistance of Professor Sir Alec Jeffreys of Leicester University who had developed a technique for creating DNA profiles. Through various DNA extraction techniques, semen samples from both murders were compared against a blood sample from the suspect. The result proved that both girls were killed by the same man, but it was not the suspect. He became the first person in the world to be exonerated of murder through the use of DNA profiling.

Police then obtained blood samples from about 5,000 male inhabitants in the area to identify a new suspect. DNA profiling was then carried out on the men who had the same blood type as the killer. The murderer was finally caught after a man was overheard saying that he had helped the murderer evade the DNA test by pretending to be him. The murderer was arrested and his DNA profile matched with the semen from both murders. He eventually made a full confession and he was convicted and sentenced to life imprisonment for the two murders.

From then on DNA technology has been used in a variety of circumstances in criminal trials to secure convictions. But it has also provided the means to exonerate suspects who might otherwise be incorrectly charged with and convicted of crimes.

The added importance of DNA technology is highlighted by the experience in the United States where a number of convicted persons have their convictions quashed on the basis of DNA evidence proving their innocence. Among them, many have been on death row awaiting capital punishment. This prompted a number of initiatives in the United States which has had an impact throughout the world on developing DNA technology and on placing greater reliance on it.

DNA Technology

When an offender leaves any DNA sample at a crime scene, such as blood, hair, sweat, semen, saliva or skin tissue, a comparison can be made to find a match with a DNA sample from a suspect or from a DNA database.

Talking about DNA technology, you of course know a lot more than I do. So I shall skip the basics about DNA and go straight to DNA profiling. In the 3 billion bases making up the 46 chromosomes, only a small fraction of that DNA sequence is involved in controlling the makings of the body. And DNA profiling involves the creation of a profile from specific sites on the non-coding or junk sections of the DNA molecule. The number of sites or loci examined depends upon the system used, with the greater the number of loci examined, the more reliable the test results.

Scientists can generate a DNA profile of an individual from a sample by extracting the DNA, and analysing it for the presence of a set of specific DNA regions (markers). Scientists find the markers in a DNA sample by designing small pieces of DNA (probes) that will each seek out and bind to a complementary DNA sequence in the sample. A series of probes bound to a DNA sample creates a distinctive pattern for an individual. Forensic scientists compare these DNA profiles to determine whether the suspect's sample matches the evidence sample. A marker by itself is usually not enough but if two DNA samples are alike at four or five regions, odds are great that the samples are from the same person.

If there is a match between the samples, the analyst will consider the statistical likelihood that the sample taken from the crime scene (or the victim) could have come from someone other than the suspect.

What is aimed at in DNA profiling is identification through probabilities rather than any fixing of identity. In the evaluation and interpretation of DNA profiles the following statistical questions need to be considered: (i) what are the odds that these profiles would be found for samples from the suspect? (ii) what are the odds that these profiles would be found for samples taken from a different person? The ratio of these two odds constitutes the 'likelihood ratio'.

The taking of DNA samples

With the expanded use of DNA evidence, there are debates, especially in the United States, on whether it is a "diviner of guilt" or a threat to civil liberties. The balance between collective security and individual freedom is a delicate one. So let us now take a look at the regulatory framework for the taking of DNA samples in Hong Kong.

In order to combat crime and to maintain law and order, certain provisions were enacted in June 2000 to provide law enforcement authorities certain powers to take what is described as intimate or non-intimate samples from a person and to establish a DNA database.

As you may know already, an intimate sample means blood, semen, urine or other tissue fluid; hair other than head hair; a dental impression; and a swab taken

from a private part of a person's body or from a person's body orifice other than the mouth.

Non-intimate samples include head hair, a sample taken from a nail or from under a nail; a swab taken from the mouth; saliva; and identifying particulars such as photographs, fingerprints, sole-prints, and the weight and height measurement of the person.

Under the Police Force Ordinance Cap.232, an intimate sample may be taken from a person for forensic analysis only if a police officer of or above the rank of superintendent authorises it upon his having reasonable grounds (a) for suspecting that the person has committed a serious arrestable offence (which means an offence for which a person may be sentenced to imprisonment for not less than 7 years), and (b) for believing that the sample will tend to confirm or disprove the commission of the offence. Consent by the person from whom the sample is taken, and approval from a magistrate are also required.

The criteria for taking non-intimate samples are less stringent. Such samples may be taken from a person with or without his consent for forensic analysis, if the person is in police detention or is in custody by court authority. However, the same safeguards regarding authorisation by a police officer of or above the rank of superintendent upon the same reasonable grounds also apply.

The establishment of a DNA database

In line with the world trend, Hong Kong has its DNA database. The DNA Database Section was set up in October 2000 in the Hong Kong Government Laboratory. Its main responsibilities are to perform DNA analysis on samples from persons convicted of a serious arrestable offence and those suspected of having committed a criminal offence. Our DNA database includes non-intimate samples of swabs from the mouths of convicted persons and those given voluntarily.

The establishment of a DNA database is an important initiative for it can both be the means for the detection and the deterrence of crime. By matching the DNA of a registrant with the DNA of a sample taken from a crime scene, the wrongdoer can be detected. And by registering the DNA of a person convicted of a serious arrestable offence, such as a convicted sex offender, it will hopefully deter such a person from re-offending, knowing that any bodily substance left at a crime scene could provide a match to their registered DNA sample.

Granted DNA databases are an effective investigative tool, the experience of early adopters of DNA technology like the UK demonstrates that a bigger offender database is much more effective than a smaller database. Accordingly, we have seen a recent trend towards expanding the criteria for inclusion in DNA databases. Nevertheless, this does not go without challenge.

In a recent decision, the House of Lords rejected a challenge against the retention of fingerprints and DNA samples where the person from whom the fingerprints or sample was taken had not been convicted of a criminal offence. The

House of Lords held that the retention of such materials constituted only a modest interference with the person's right to respect for his private life under Article 8 of the European Convention on Human Rights and was objectively justified as being necessary for the prevention of crime and the protection of the rights of others.

The House of Lords also held that the difference in treatment between a person acquitted of the crime and a person convicted of it did not offend the prohibition of discrimination under Article 14 of the Convention. In the leading judgment of Lord Steyn, he pointed out that "It is not in doubt that the taking of fingerprints and samples from persons suspected of having committed relevant offences is a reasonable and proportionate response to the scourge of serious crime."

DNA technology in action

Now, to paint a fuller picture of the different aspects concerning use of DNA technology in criminal justice, let me refer you to some local and overseas cases.

As mentioned earlier, DNA evidence has proven critical both in securing guilt and in proving the innocence of a person. In R v Yee David the applicant was convicted after trial of two similar robberies, one of which involved the rape of the robbery victim. The only evidence against the applicant was his identification by the victims at identity parades. Although they both picked out the applicant at identity parades, they also picked out actors at different identity parades where the applicant was not present.

On appeal, fresh evidence was admitted relating to DNA tests on semen stains found on the rape victim's night gown (which did not match the DNA profile of the victim's husband or of the applicant). The expert carried out DNA analysis under the four probe-typing systems and found that the applicant had DNA profile characteristics different in all four systems from the semen on the night gown. The applicant's appeal was upheld on the basis that this fresh evidence rendered the convictions unsafe and unsatisfactory.

While there is no dispute about the general validity of the general principles underlying DNA typing, it is important for the experts to demonstrate clearly and rigorously the scientific basis and reliability of their evidence based on DNA technology.

In HKSAR v LIU Man-fai, an early DNA case in Hong Kong, the respondent was charged with assault occasioning actual bodily harm to another person. The evidence against the respondent at trial was the DNA profile of some bloodstains found on his jacket which matched the DNA profile of the victim. The magistrate put little or no weight on the evidence of the experts because he found that the experts had referred to the so-called "PCR-based DNA-STR systems" without providing the necessary scientific criteria. The experts referred to the tests they had performed without explaining in any detail how they were done and on what scientific basis. They basically concluded that the DNA profile of the bloodstains matched the DNA profile of the victim because the chance of selecting a person at random from the local

Chinese population who would have the same determined DNA profile as the bloodstain was about 1 in 42.1 million.

The prosecution appealed to the Court of First Instance on the basis that the magistrate erred in his rejection of the expert evidence. However the magistrate's ruling was upheld. The Court noted that the technology of using a DNA test to confirm the identity of a person involved in a case was first employed by foreign courts in the late 1980s. It was then introduced to the courts of Hong Kong in the late 1990s. Although this kind of technology had been widely used in the United States and European countries and had been commonly accepted by their courts, as far as Hong Kong was concerned, it still belonged to a relatively new method of scientific examination. It was therefore normal for a judge at trial to ask the party who produced the relevant evidence to provide, for the consideration of the court, the theoretical and technological basis of using DNA analysis as forensic examination and identification. Both the trial judge and jury were entitled to and should be informed of the basis upon which the expert has reached his conclusion.

The Court noted that the guidelines set out in the English Court of Appeal in R v Doheny; R v Adams could serve as a reference for the courts of Hong Kong in dealing with this type of testimony and evidence.

According to the Court in Doheny, the reasoning that there was only a one in million chance that the defendant had left the crime stain, and that the defendant was guilty of the crime because only one person in a million would have a matching DNA profile, and that the defendant has a matching DNA profile, was fallacious. They referred to this as the "Prosecutor's fallacy".

The significance of the DNA evidence would depend critically upon what else was known about the suspect. Provided there was no reason to doubt the matching data or the statistical conclusion based upon it, the random occurrence ratio deduced from the DNA evidence, when combined with sufficient additional evidence to give it significance, was highly probative.

If the suspect had a convincing alibi at the other end of England, it would appear highly improbable that he could have been responsible for the crime, despite his matching DNA profile. If, however, the suspect was near the scene of the crime at the relevant time, or there was other evidence suggesting that he was the culprit, the DNA evidence became very significant.

Further, any issue of expert evidence should be identified and resolved before trial as part of the pre-trial review. When giving evidence, the expert should not overstep the line which separated his province from that of the jury. If I may add, this is a warning which is of general application to medical experts. I have come across cases where the crucial medical evidence was excluded because it went too far and tried to usurp the jury's function. The expert should properly explain to the jury the nature of the match between the DNA from the stain at the scene of the crime and the defendant's DNA, and give the random occurrence ratio on the basis of empirical statistical data. That would often be the limit of the evidence which the expert could properly and usefully give. It would be for the jury to decide whether they were sure that it was the defendant that had left the stain at the scene of the crime.

The expert should not be asked his opinion on the likelihood that it was the defendant who had left the stain at the scene of the crime, nor when giving evidence should the expert use terminology which might lead the jury to believe that he was expressing such an opinion. It was not appropriate for a statistician to expound to the jury a statistical approach for evaluating the likelihood that it was the defendant who had left the scene of the crime.

As to a judge's summing-up to a jury, the Court explained that the jury would likely need careful directions in respect of any issues of expert evidence and guidance to dispel any obfuscation which might have been engendered in relation to the areas of expert evidence where no real issue existed.

There have been a number of challenges to DNA evidence which have included questioning its admissibility or attacking its reliability through other methods of statistical analysis. Whilst these challenges have failed, they have helped identify important factors or issues relating to DNA evidence in the context of a criminal trial.

In HKSAR v CHEUNG Shing, the applicant was convicted of 5 counts of rape and 4 counts of robbery. The evidence in the case was that the control samples from the applicant matched the samples taken from the victims or the places where the crimes were committed. The control sample from the applicant was compared with a database, in this case, the Red Cross database. The database had been collected in Hong Kong from persons who were ethnic Chinese. When the control samples were compared with the database, the occurrence rate of the applicant's DNA profile was said to be one in 3.4 million.

The Court noted that there were two aspects to the background of DNA profiling with the method used and what is sought to be proved by that evidence. Firstly, the control sample from a suspected person is matched scientifically with the specimens recovered. If matched, that profile does not produce a unique result, such as is produced by the matching of fingerprints. It is then necessary to compare the control sample with a database of those of the same ethnicity. And when that is done it is possible to calculate by statistical evaluation the likelihood of the same DNA in members of the same ethnic population.

The English Court of Appeal dismissed a challenge that DNA evidence could be excluded because it was no more than a rough estimate, inconclusive in itself and inadequate to found the prosecution case. It held that there was nothing inherent in the nature of DNA evidence which made it inadmissible in itself or which justified a special, unique rule, that evidence falling into such category could not found a conviction in the absence of other evidence.

In R v Denis Adams (No. 2), the English Court of Appeal held that there was no possible ground of objection in principle to the leading of DNA evidence by the prosecution, based on empirical statistical data, since the data and deductions drawn therefrom were available to the defence to criticise and challenge. However, the Court made the point that in the absence of special features, expert evidence should not be admitted to induce juries to attach mathematical values to probabilities arising from non-scientific evidence adduced at the trial.

Types of cases using DNA

DNA profiling is being used increasingly and in an infinite variety of ways in criminal investigations. From murders, to rapes and indecent assaults, and even in cases of fraud, DNA profiling can be used to link a person to a crime scene or to a particular event by finding a sample of some bodily substance.

DNA is virtually indestructible and resistant to degradation and with modern techniques DNA analysis can be undertaken from the most tenuous of samples. For instance, in the case of constable Leung Shing-yan who was shot dead in a Tsuen Wan housing estate six years ago, a surgical mask was left at Leung's death scene. A DNA test showed another constable, Tsui Po-ko, could be the contributor of DNA on the surgical mask and the killer of Leung. This shows how DNA technology could serve as an effective tool for law enforcement in different kinds of cases.

Conclusion

The cases that have come before the courts in relation to DNA technology give an instructive view of the rigours through which medical science is continuously assessed and evaluated by our criminal court processes. It is an important and essential assessment and evaluation that strives to ensure that medical science is used in a just and fair manner in the investigation and prosecution of crime.

As medical science comes to terms with what the law requires and expects, and the law comes to understand and apply medical science, greater accuracy and certainty is achieved in the use of medical science in criminal trials. DNA technology and its use in criminal prosecutions is a classic example of this.

Science is the search for truth and as science uncovers and learns more, the closer it gets to the truth. It is in that quest for truth that the law becomes involved, and in the law's quest for justice it must be ever vigilant of the truth that is asserted. On this basis, the law and science come together, and work together, in the interests of all.

Indeed, the medical and the legal professions have much in common. We both show a deep respect for human value and dignity. We are service professions dated to the ancient times, and we pledge to put the interests of others ahead of our own while providing our professional services. In this connection, may I congratulate your College for your excellent work over the years for bringing up new generations of radiologists and for upholding the highest professional standards of competence and ethical integrity in serving the community.

On that note, I wish you all good health and happiness.

Thank you very much.

Ends/Saturday, October 27, 2007