The Irish Council for Bioethics

Comhairle Bitheitice na hÉireann

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In Your Blood
Forensic DNA Databases

DAVID NICHOLLS / SCIENCE PHOTO LIBRARY

Q1 What is DNA?

DNA stands for deoxyribonucleic acid. It is a chemical that is found in the nucleus of almost every cell in the human body and carries the genetic instructions for making living organisms. DNA is inherited from both parents and is unique to every individual, with the exception of identical twins who share almost identical DNA.

Q2 What is a DNA sample?

A DNA sample is a small collection of cells, each cell contains the whole of an individual's genetic information. While most cells in the human body provide this information, there are exceptions e.g. red blood cells do not contain any DNA. However, blood can still be used as a sample because white blood cells do contain DNA. Other body materials, which might be taken as a DNA sample, include hair, urine, semen, saliva and skin. A DNA sample is used to generate a DNA profile.

Q3 What is DNA profiling?

DNA profiling, also known as DNA fingerprinting, was discovered in England in 1984 and is used for identifying the pattern of DNA that is specific to each individual. It is used to place someone at a crime scene or to exclude an individual from a criminal investigation. DNA profiling is often compared with fingerprinting because just as our fingerprint is unique, so too is our genetic make up.

The human genome is an individual's complete set of DNA. It contains about 30,000 genes, each of which contains a small segment of genetic material. The regions of the genome that contain genes (roughly 2%) are almost identical in all individuals and are said to be what make us human. The remainder of the genome has little function and is often called "genetic junk". However, the pattern of this so called genetic junk or non-coding DNA is unique to each individual and for this reason it is very valuable to forensic science. Scientists analyse the patterns in 10 small sections of non-coding DNA and compare it with e.g. bloodstains or semen found at crime scenes. The chances of two unrelated people having the same pattern in all of the 10 sections is said to be about one in a billion. However, concerns have been raised regarding the reliability of DNA profiling and it has been suggested that a larger amount of DNA e.g. 15 or 16 sections should be analysed in order to make the technology foolproof.

As well as crime detection, DNA profiling is also used to determine paternity, identify dead bodies (as was the case after the 2004 Asian tsunami) and in 2003 was used to prove that a man found hiding in an Iraqi bunker was, in fact, Saddam Hussein.

Q4 What is a DNA database?

A DNA database electronically stores DNA profiles. By using a DNA database, police can identify the possible perpetrators of crimes. As well as crime detection, a DNA database might also be used for crime prevention as those whose DNA is stored might be less likely to re-offend. There are a number of categories of people whose DNA profile might be stored on a forensic DNA database. For instance, people suspected of committing particular crimes, convicted criminals, people assisting with specific investigations, or indeed the entire population of a country (known as a comprehensive DNA database).

Ireland currently has an "unsolved crime" database, which consists of DNA profiles obtained from scene of crime stains that are thought to belong to the perpetrators. The number of unsolved crime profiles stored in the Forensic Science Laboratory is reported to be in excess of 700. Some cases have subsequently been solved since the establishment of this database.

While forensic DNA databases for the purpose of detecting and preventing crime have proved very successful, numerous ethical questions arise, including from whom samples should be taken, for what crimes they should be taken, for how long samples or profiles should be retained on file and who shall have access to this information?

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Q5 Whose DNA profile should be stored on a forensic DNA database?

The General Population

There have been suggestions that every member of society should have their DNA profile stored on a forensic database. In fact, the Portuguese government has recently announced plans to establish the World's first comprehensive database, which will contain DNA profiles from every member of the population. Proponents say that the advantages of a comprehensive database would be that crimes could be solved more rapidly and people would be less likely to be discriminated against because every member of the population would have to give a sample. While those in favour of a comprehensive database argue that only the guilty have anything to fear, others argue that it would be unacceptable for individuals, who are not involved in criminal behaviour, to be forced to give the police access to their most intimate and private information. Opponents also argue that sampling the entire population is disproportionate and creates an imbalance between personal freedoms and community security.

Suspects

Individuals suspected of or charged with committing a crime might be sampled in order to help establish whether or not they are guilty. While proponents of forensic DNA databases say that sampling suspects and those charged with committing a crime would greatly assists the police in solving crime, opponents state that the presence of a person's DNA at a crime scene is not conclusive evidence of his/her guilt.

Convicted Criminals

Convicted criminals who are in prison, on temporary release or on probation when a DNA database is launched might be sampled in order to check whether they have had some involvement in past offences, for which they have not been convicted or indeed to deter them from committing future crimes. Critics of the taking of samples from convicted criminals suggest that someone who is already paying their debt to society should not be forced to provide a sample which may result in them being continually discriminated against. While proponents argue that many crimes have a high rate of recurrence e.g. burglary and car crime and that profiling convicted criminals may limit the number of crimes or at least make it easier to solve them.

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People Assisting Police with Criminal Investigations

In any crime investigation where DNA is involved it will be necessary to take samples from the victim and from all other people who had contact with the crime scene but are not suspects. This will allow the police to rule people out of their investigations. The practise of sampling this group is generally accepted, once informed consent is obtained and the samples and profiles are destroyed after the case has been solved.

Individuals might also be invited to participate in a mass screening. A mass screening involves samples being taken from a defined group of people based on, for instance, gender, age, or ethnicity, in order to identify the perpetrator of a crime. It should be noted that because mass screening is extremely time-consuming and expensive, it is typically used only as a last resort, for instance when there is no suspect.

Q6 For what crimes should samples be taken?

In general, international practice has been to obtain samples from those suspected of the most serious offences, such as murder, rape or armed robbery, which carry a potential sentence of five years or more. However, the database in England and Wales is the exception as samples are taken for recordable offences i.e. minor offences, which carry short prison terms or no prison term at all e.g. loitering or shoplifting. While this model has provided many positive statistics; for instance, it is estimated that in a typical month the database links suspects to 15 murders, 31 rapes and 770 car crimes, it has attracted significant criticism.

Concerns have been raised that DNA samples could compulsorily be taken from those suspected of minor offences and that this method of obtaining profiles could result in "investigative arrests" i.e. people being arrested just to obtain DNA evidence.

Critics of forensic DNA databases also raise concerns that mass screenings, which are supposed to be used to eliminate people from an investigation and identify the perpetrator, may be used as a "dragnet" merely to obtain DNA profiles for storage and that people might suffer discrimination in their local communities as a result. They also argue that given the invasive nature of obtaining DNA samples e.g. taking blood or mouth swabs, the technique should only be used to solve the most serious crimes.

Q7 For how long should samples and profiles be stored on a DNA database?

The retention of DNA samples and profiles raises a number of ethical questions. Proponents argue that they should be retained indefinitely and state that storing them would greatly benefit society because crimes with a high rate of recurrence would be solved more quickly. Advocates of indefinite retention have also suggested that retaining samples and profiles would aid crime prevention because those whose information was stored might be less likely to re-offend. However, some people find the indefinite retention of DNA samples and profiles worrying. They fear that even though someone had been eliminated from an investigation or, in the case of convicted criminals, had paid their debt to society they would continuously be treated as an automatic suspect in any criminal investigation and be discriminated against. For this reason, they call for samples and profiles to be destroyed on completion of a criminal investigation or once someone has completed their prison sentence.

Q8 Who will have access to information contained on the database?

The right to privacy i.e. our right to control access to ourselves and to our personal information is protected by the Irish Constitution. However, this right is not absolute and may be overridden in the interest of society and community safety, as in the case of criminal investigation. The Data Protection Acts, 1988 and 2003 require those who hold and control personal information, including genetic information, to ensure that information collected is done so fairly and that suspects are informed who will have access to their information.

DNA can provide sensitive information about individuals and their families, such as their susceptibility to certain diseases. Therefore, there are concerns that the use of DNA profiles could gradually expand and information could be transferred to e.g. insurance or employment agencies without the knowledge or consent of the individuals concerned (a phenomenon known as "function creep"). Were genetic information about a person to be given to an insurance company, for instance, that person might be prohibited from taking out life cover and could in turn be prevented from acquiring a mortgage.

In 2007, Ireland signed an agreement to share forensic DNA profiles with all 27 EU member states to help fight cross-border crime and terrorism. This agreement means that other EU police forces will be allowed to search the planned Irish database for people suspected of committing a crime abroad. Proponents of the agreement argue that in Austria and Germany, where the system is already in place, almost 3,000 DNA profiles have been matched with criminal investigations (32 of which related to murder). Opponents argue that giving EU police forces access to the Irish database would unfairly compromise privacy because it would be unclear who would have access to sensitive genetic information once it was transferred to another jurisdiction e.g. commercial companies.

Q9 Should the forensic service be allowed to use the "cold hit" technique?

The "cold hit" technique involves matching a DNA profile generated from a crime scene sample against a DNA database. Cold hits are used in crimes where there is no suspect, to determine whether one of the individuals whose profiles are stored on the database could be a match. According to the Strathclyde police department in Scotland, on average 60% of crime scene samples match a person already on the database. Police forces using the cold hit technique claim that it has helped them solve many crimes especially cases of stranger rape. The cold hit system can also eliminate people incorrectly identified as suspects or indeed convicted of criminal offences.

Concerns have been raised in relation to the cold hit technique. For instance finding a person's DNA at a crime scene is not proof of his/her guilt. The presence of DNA could be the result of coincidence, as a result of contamination or tampering or may have been deliberately planted to incriminate. Therefore, opponents say that DNA evidence should always be backed up with corroborating evidence e.g. eyewitness accounts, CCTV footage or evidence of a motive.

While the forensic DNA profiling technique is constantly improving it is not infallible and mistakes have been made. There have been a number of cases where false matches or "false positives" have led to innocent people being wrongfully accused of committing a crime. Opponents, therefore, argue that the possibility of mistakes being made undermines the usefulness and reliability of forensic DNA databases in general and of the cold hit technique in particular.

Q10 Might the taking of biological samples impinge on a person's right to bodily integrity?

The right to bodily integrity provides protection from unwarranted physical interference and is closely linked with the right to freedom from torture, inhuman or degrading treatment and is protected by the Irish Constitution. However, the right to bodily integrity is not absolute, which means that it can be overridden in the interests of protecting the wider community e.g. the prevention and detection of crime.

Q11 Does Ireland have any specific legislation in relation to forensic DNA profiling/databases?

In the 2003 Criminal Justice Bill, the then Minister for Justice, Michael McDowell T.D. first announced plans for the establishment of a database of DNA profiles. The Criminal Justice (Forensic Sampling and Evidence) Bill, 2007 has been presented to and approved by Government and is due to be published towards the end of 2007. This bill states that samples can be taken from people where the offence carries a penalty of more than one-year imprisonment. Under the bill, samples can be taken from suspects, convicted criminals and people who need to be eliminated from an investigation because they may have inadvertently contaminated crime scene samples e.g. members of the victim's family, Gardaí or forensic scientists. The bill also allows the Gardaí, to use reasonable force to obtain samples from suspects or convicted criminals who refuse consent.

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