



Potential Benefits of Dna Technology

KEYWORDS

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ABSTRACT *Advanced scientific technology in general and Forensic Medicine in particular heralded a new dimension in the crime investigation process. Especially, DNA Analysis has created a revolution in the detection of crime. Because hand-writing and finger-printing for identification of the criminal are not always available on the crime spot, looking for other evidences inevitable. Now-a-days the criminals are much more alert and intelligent and they do not leave finger or foot print impressions on the crime spot. However, even the intelligent criminals leave behind some clue materials on the crime spot like, used cigarette ends, hair roots, urine-stains, semen- stains. But up-till now, there is no such specific Forensic Legislation in India enabling the Investigation Officer, to collect blood sample, urine sample, hair root sample, saliva sample, semen sample or for taking X-ray Photography or Ultra-sonography of the suspects. This has created a great trouble for collection of evidence on the crime-investigation process.*

General

DNA technology was developed by Sir Alec Jeffreys, a Professor at the University of Leicester in the United Kingdom in 1984. This was sequel to his discovering that certain sequences were repeated within a gene that does not contribute to the function of a gene. Forensic DNA analysis was introduced to the American Criminal Justice system in the mid 1980s. Though the DNA's chemical structure is the same for all, there is a recognizable difference in the order in which the millions of base pairs are found in each person. It is this difference that is captured by DNA testing. DNA can be extracted from almost any tissue, including root of hair, finger nails, bones, teeth and bodily fluids. There are many unusual sources of DNA evidence that need to be explored by an investigator. These includes saliva found on the flap of an envelope containing a threat letter, spittle collected from the sidewalk where a suspect in a sexual assault case was under surveillance and blood collected from a bullet that had injured an assailant himself in a case of murder. DNA is a very important and useful tool for solving crimes and convicting criminals. DNA technology is evolving rapidly, and scientists are constantly finding new applications for its use by law enforcement personnel.

What is DNA?

DNA is the abbreviation for Deoxyribo Nucleic Acid, which is the genetic material present in the nucleus of cells in all living organisms. DNA has been called the "blueprint of life," since it contains all of the information required to make an organism grow and develop. It encodes all of the information that gives each of us our physical characteristics and allows us to function and be recognized as humans. The majority of the DNA is identical from one human to another, but there are locations in the DNA that have been found to differ from one individual to another, with the exception of identical twins. These are the regions of DNA that are analyzed and used to compare the DNA obtained from an unknown evidence sample to the DNA of a known individual in DNA identification testing. Because each individual inherited half of his or her DNA from each parent, DNA testing can be used to determine

if individuals are genetically related to each other. DNA is found in all cells within the nucleus and is the same throughout the body, so virtually every fluid or tissue from a human contains some DNA and can be analyzed by DNA identification testing. DNA also is stable and does not change over time, so samples collected years ago may be compared to samples collected recently.

Why DNA?

Forensic DNA analysis involves the intersection of several scientific disciplines including molecular biology, genetics, and statistical analysis. In order to understand the usefulness, as well as the limitations of DNA in the analysis of physical evidence, it is important to be familiar with some basic underlying principles of these diverse disciplines.

Approximately 99.5% of the DNA code is the same for all people. This is what makes us human beings rather than turnips or porcupines. It is only the other 0.5% (one-half per cent) that is of interest to the forensic scientists. This portion may vary greatly between individuals and may manifest itself in individual traits such as eye, hair color, and blood type. More often the differences in DNA sequence do not show themselves in physical appearance, but must be investigated using special laboratory techniques.

How Are DNA And Other Forensic Evidence Collected?

The way DNA evidence is collected and preserved is critical to the success of its use in criminal cases. DNA evidence is particularly important in sexual assault cases, so it is important for sexual assault victims to notify the police before showering or changing clothing after an assault. Semen may be on the clothing, bedding, or still in the vaginal region. The skin cells of the assailant may be found under a victim's fingernails. A broken fingernail left at the scene by the perpetrator may also be analyzed for DNA evidence. Victims should not wash or throw away anything that the assailant's semen may have come into contact with like- bed sheets or covers, rugs, cushions, cloths, tissues, or condoms. If the person was assaulted in a house or apartment, the police may be able to collect fingerprint

and other evidence from the scene. The police will collect evidence from the scene of the crime, and evidence that is on or in a victim's body can be collected by a physician or sexual assault nurse examiner during an examination after a sexual assault. A medical examination is conducted to make sure the victim is okay, to treat any injuries, to test for sexually transmitted diseases, and to look for and collect any evidence.

The doctor or nurse will use sterile cotton swabs to remove fluids which might contain semen from the victim's vagina or mouth or other parts of the body touched by the assailant. If the victim scratched the assailant, they will scrape under her fingernails to recover skin cells.

They may also collect head and pubic hairs and take a blood sample. In most cases, the victim's clothing will be collected, so the doctor or nurse should provide something else to wear. In cases of homicide, DNA evidence may be collected from the crime scene and from the body of the victim by the pathologist conducting a forensic autopsy.

How does DNA testing work?

There are several chemical processes used in the analysis of DNA evidence. While these processes are very reliable, sometimes results cannot be obtained or are inconclusive if there is not enough evidence to analyze or if the evidence has been contaminated or improperly preserved. The types of processes and the technology used in processing DNA evidence are increasing in sophistication and ability to distinguish individuals, so it may be possible to test evidence in the future in ways that are not possible today. DNA testing can take weeks or months to complete and can be expensive for some agencies. During a criminal investigation, the costs are paid by the police department or the prosecutor's office.

There are two types of DNA tests that may be performed, depending upon the type of evidence available.

1. Restriction fragment length polymorphism (RFLP) testing usually requires a sample that has 100,000 or more cells (an example would be a dime-sized bloodstain) and contains DNA that is not degraded (broken into smaller fragments). RFLP has been widely used since the late 1980s and is able to exclude wrongly accused individuals with only one or a few test results.

2. Polymerase chain reaction (PCR) testing can be conducted on DNA from different parts of the cell: the nucleus and the mitochondria. PCR testing of DNA from the nucleus of the cell can be done on small samples containing 50 to 100 cells or more (for example, a visible dot of blood or a single hair root). PCR testing on nuclear DNA has been available since the early 1990s. It can be used on DNA that has been degraded (samples that have been improperly stored or aged) and has a high degree of reliability.

DNA is a useful and neutral tool in the search for justice. It can cut both ways: DNA evidence can help prove innocence or guilt. News reports about convicted persons being released after old evidence is tested for DNA appear regularly. Many sexual assault and homicide cases occurred before DNA testing was an option or was widely recognized. In some cases, convicted defendants who maintain their innocence have sought to have evidence tested to see if the DNA from that evidence matches their own. Convicted persons have had their convictions overturned

or have been released because DNA testing showed they could not have committed the crime. Many of these cases involved convictions that were based primarily upon eyewitness identification of the alleged perpetrator. DNA typing is now being used to assist investigators in solving crimes in which a suspect has not readily been identified. DNA has been used to connect a particular perpetrator with other unsolved assaults.

United States of America:

In USA, all scientific evidence in criminal trials including evidence derived from DNA identification analysis must satisfy the test of admissibility in effect in a particular jurisdiction. In general, courts use one of two tests. The so-called Frye test, which was pronounced by the US Circuit Court for the District of Columbia in *Frye v. United States*, or one of its variations, is used in a majority of jurisdictions. Under the Frye test, a novel scientific technique must have gained general acceptance in the relevant scientific community before it is admitted by the court. The second rule follows the basic relevancy standard of the Federal Rules of Evidence, and is used in a majority of State jurisdictions.

England:

England is widely recognized as having the most effective and efficient approach to the use of DNA technology in the world. DNA technology and DNA data basing have been central to the process of criminal investigation. Since the establishment of the National DNA Database (NDNAD) in 1995, England has become a world leader in discovering innovative ways to use DNA to identify suspects, protect the innocent and to convict the guilty.

Australia and Canada:

It appears from the case study that Australian courts have shown some reticence in admitting DNA evidence and in protecting the rights of the accused, particularly in the situation of conflicting expert evidence.

However, Canadian courts have generally admitted expert testimony on a broader range of issue instead of focusing narrowly, as has been the approach of courts in England and Australia.

India

The Constitution of India, by article 51A (h) and (j), commands that it shall be the fundamental duty of every citizen of India "to develop the scientific temper, humanism and the spirit of enquiry and reform" and "to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements". Though there is no specific DNA legislation enacted in India, sections 53 and 54 of the Code of Criminal Procedure, 1973 (Cr PC) provide for DNA tests implied and they are extensively used in determining complex criminal cases. Section 53 deals with examination of the accused by medical practitioner at the request of police officer if there are reasonable grounds to believe that an examination of his person will afford evidence as to the commission of the offence. Section 54 of the Cr PC further provides for the examination of the arrested person by the registered medical practitioner at the request of the arrested person.

By the Amendment Act of 2005, the Cr PC was amended inter alia to add new section 53-A which mandates the examination of a person accused of rape by a medical practitioner. Apart from these provisions, section 45 of the Indian Evidence Act, (1872) is more important so far

as the admissibility of DNA evidence is concerned. Section 45 deals with the opinion of the expert. It states; "When the Court has to form an opinion upon a point of foreign law, or science or art, or as to identity of handwriting (or finger impressions), the opinion upon that point of persons specially skilled in such foreign law, science or art (or in question as to the identity of handwriting or finger impressions) are relevant facts." Section 293 of the Cr PC deals with reports of certain government scientific experts. Section 293(2) provides that the court may, if it thinks fit, summon, and examine any such expert as to the subject-matter of his report.

Conclusion:

DNA tests are highly effective because every person's DNA is unique except for identical twins. The greatest assets of DNA are that it cannot be tampered. DNA test can be used to establish parentage of a child, detect crime and identify mutilated dead corpses. DNA tests are of immense helps in Criminal Administration of Justice and also in some Civil disputes like Succession, Inheritance etc. DNA tests are very strong evidence as they are correct up to 99%, if positive, and 100% if negative.

Mallimath Committee recommended for a specific Legislation on DNA giving guideline to the police for setting uniform standards for obtaining genetic information and creating adequate safe guards to prevent misuse of the same. A National DNA Database should be created which will be immensely helpful in the fight against terrorism and hardened criminals, more well equipped Laboratories and suitable infrastructures should be established to handle DNA Samples and Evidences so that timely reports are available. Efforts should also be made to create more awareness among general public, prosecutors, judges and police machinery.

While introducing a Scientific Legislation for application of DNA Technology in our legal system, we have to keep in mind certain guiding principles culled from the experience of several other Countries where DNA Legislations are already been introduced. Almost 43 states in USA have Statutes and Legislation regarding mandatory submission of blood samples for DNA identification. Almost 14 states have Legislation regarding the admissibility of DNA evidence. However while introducing the Scientific Legislation for application of DNA technology in India; the conflicting decisions of the Supreme Court and the uncertainty prevailing about DNA technology have to be cleared. There should not be any problems either legal, ethical or moral must be allowed to stand in the way for adapting DNA technique which is scientifically accurate, exact and free from error. In order to overcome such legal and moral constraints if any, necessary changes are to be made in the existing enactments for the smooth passage of such Legislations.

Further, new Legislations must also provide mandating the collection and analysis of samples for DNA Data Bank and establishment of DNA Database. The Legislation must also provide for the establishment of National Committee on DNA typing to provide expert advice on scientific and technical issues.

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