



## DNA FINGERPRINTING: BOON OR CURSE

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### Abstract-

DNA is present in every cell of the body, it is actually the “programming code” of how the body functions correctly. DNA fingerprinting is a laboratory technique that can help to determine the identity of an individual from a small sample of their DNA. There are unique patterns in the DNA of an individual. Identification of these patterns makes it possible to see if that particular individual was present at the scene of a crime or not, because hair, skin flakes, or blood are mostly left behind in criminal scenes. DNA fingerprinting technology is now of utmost importance, helping the law and justice enforcement agencies to identify suspects. Also DNA kits are extensively being used to track ancestry of an individual and family tree forensics, this has helped to solve a number of cold cases. 99.9% of the DNA is exactly the same, it is just 0.1% which is unique to an individual.

**Keywords-** DNA Fingerprinting, legal issues, advantages and disadvantages, sample collection, interpretation.

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**INTRODUCTION-**

DNA fingerprinting has been elemental in transforming the criminal investigations world over. DNA left at crime scenes is among the most valuable evidence used to determine presence or absence of an individual at the scene. The unique sequence of DNA of every individual can help to prove a person's innocence or guilt with enough accuracy. DNA fingerprinting is thus proved to be a powerful tool helping in acquitting wrongly accused defendants. On the other hand, DNA fingerprinting can also damage a person's case if not obtained, handled and tested properly. This technique was first used in 1980's, and since then it has changed the legal system in providing justice in the criminal law.

The various technologies used in DNA Fingerprinting are-

- Restriction Fragment Length Polymorphism (RFLP)- This was first technique that was adopted for forensic DNA analysis, but it required a greater amount of better quality DNA.
- Polymerase Chain Reaction (PCR) Analysis-- In Polymerase Chain Reaction (PCR) exact copies of DNA are made from the available biological samples. Hence small amount of DNA is sufficient for analysis.
- Short Tandem Repeat (STR) Analysis- This is the latest method of DNA profiling. Short tandem repeat (STR) is also called microsatellite analysis has advantage of higher discrimination and also lesser time is required to obtain results. It also needs a smaller sample size. STRs are locations (loci) on chromosome that repeat within the DNA. The repeat sequence is of 3-7 bases, the entire length of STR is less than 400 bases. So, the susceptibility of STRs to degradation is less and it can be obtained even from bodies or stains that have undergone decomposition. The Federal Bureau of Investigation (FBI) employs a standard set of thirteen specific STR regions.
- Mitochondrial DNA Analysis (mt DNA)- mt DNA is valuable in investigation of long standing unsolved cases [6]. Older biological samples like hair, bones and teeth can be analysed with mt DNA. Mitochondrial DNA is proving to be useful in maternity disputes because mitochondria comes from mother's egg cell. Male sperm contributes only nuclear DNA to the embryo.
- Y-chromosome Analysis
- Rapid DNA ID Microchip-Based Genetic Detectors.

**Uses of DNA Fingerprinting-**

- Establish paternity.

- To prove the presence or absence of an individual at a crime scene.
- Identify an old /degenerated dead body.
- Match organ donor's tissue with recipient in transplants.
- Identify genetic diseases.
- To find some cure in hereditary conditions.

**DNA PROFILING AND CONSTITUTIONAL AND LEGAL PROVISIONS IN INDIA**

The fundamental legal document is the Indian Constitution. Part III of our constitution Guarantees "Fundamental Rights of freedom" to the people of India. Article 20(3) of the Constitution provides safety of an individual from being a witness against himself. Further, Article 21 prohibits unauthorized interference in the life and personal freedom of each person. Hence DNA profiling technology must meet the requirements of Article 20 (3) and 21 of the Constitution. Code of Criminal Procedure (CrPC) under section 53 and 53-A establishes the framework for DNA profiling of persons in criminal investigations. "Section 53(1) provides for DNA profiling of the accused at the request of the Police. Section 53A also provides for DNA profiling of those accused of rape. The Indian Evidence Act 1872, under sections 45-51, provides for the "admissibility of expert opinion as a relevant fact in courts."

Article 21 of The Constitution of India declares that "No person shall be deprived of his life or personal liberty except according to procedure established by law" [10]. The Indian Supreme Court declared DNA profiling to be a reliable and effective technique to compare suspect DNA with sample DNA collected at the crime scene. DNA evidence is now a predominant forensic technology to identify criminals.

DNA fingerprinting is not considered as evidence under Indian Evidence Act 1872 and Criminal Procedure Code 1973. DNA needs to be properly collected, preserved and documented before being presented to the court as evidence. Section 53 of Code of Criminal Procedure 1973 "gives authority to a police officer to get the assistance of a medical practitioner for investigation purpose." The amendment of CrPC by the CrPC (Amendment) Act, 2005 includes two new sections. This allows the investigator to collect DNA samples from the body of the individual accused and the victim with the help and under the guidance of a medical practitioner. Still there are doubts about presenting DNA as evidence in courts even though courts do not deny the accuracy and reliability of DNA fingerprinting. There is a definite and urgent need

to re-examine these sections of Criminal law so as to manage the science and technological issues in order to provide justice. The DNA technology bill 2019 aims is to regulate the use of DNA fingerprinting technology in India.

#### ADVANTAGES OF DNA FINGERPRINTING

- DNA fingerprinting can help in establishing the identity of an individual.
- No two people have the exact same DNA, just like no two can have same fingerprints. Hence it is possible to identify an individual from his/her DNA.
- This technology has provided the investigators with another option to consider for evidence. Skin flakes and hair follicles are shed all the time. Even bodily fluids released by sneezing contain DNA traces, all these help the law enforcement agencies for identification purposes. A simple sneeze or cough might prove enough to secure a conviction.
- DNA can be stored for an indefinite period. Also DNA fingerprinting banks and databases are being established world over.
- This data can be transformed into information points and moved through email, messaging, and other forms of communication immediately.
- DNA fingerprinting does not require any intricate method, infact a single cheek swab is enough to gather the necessary information. This process is as easy as taking fingerprints.
- A specific sample size is not required to get the necessary information.
- The DNA sample can be amplified with contemporary technologies, creating markers from very small sample sizes.
- Treatments of genetic disorders are now possible because of DNA fingerprinting.
- Hereditary conditions are usually present with a genetic element. DNA fingerprinting helps to identify specific genetic conditions in individuals. It can also help in identifying individuals who are at risk of developing some specific cancers.
- DNA fingerprinting has proved useful to discover ancestry and heritage of individuals. This information can then be used to determine parentage or to find a lost family member.

#### DISADVANTAGES OF DNA FINGERPRINTING

##### DOES DNA EVER LIE?

DNA is a widely used form of evidence in criminal cases .If utilized appropriately, it can change a defendant's life for the better, but inappropriate use can also do the worse.

- DNA fingerprinting is a technology that relies on human accuracy.

DNA fingerprinting might be of utmost importance to the criminal law and justice system to identify suspects or finding parentage, but it relies on humans to process and apply that information. Manual errors might prove to be disastrous in cases of criminal justice.

- Ethnic targeting is quite a threatening possibility with this technology.

The human tendency of trying to kill/remove people who are different from the majority is a known worst trait of humanity. Nazi war of Germany is one of the the most famous example but many other ethnic cleansing campaigns have taken place in the 20th century.

- While submitting DNA for fingerprinting, people sign off their rights of freedom.

The at-home DNA kits, commonly sold on Amazon and other retail locations can give people access to personal information. Any individuals genetic profile can be accessed anytime by anyone because it now gets stored in a database.

- Many Agencies can store DNA fingerprints for indefinite periods. For example, screening infants for PKU is a life-changing DNA test but their profiles are stored forever in databases in some states. This can be misused at any time by implanting DNA falsely at a crime scene.
- DNA fingerprinting could be misused by many religious communities and insurance companies. They can deny entry of a particular ethnic group or deny insurance coverage according to what the DNA of an individual says. This could lead to development of a society where children would have little say in who they could become.
- DNA evidence is a not a perfect, 100% accurate approach.

Several false matches can occur with our current technology. It is not a reliable test when only the 13 common markers are used for testing and nothing else.

- There has to be a correct interpretation of the data for it to be useful.

There has be an accurate interpretation of the age, quality, and other factors of each DNA sample to determine the guilt or innocence of an individual. DNA is left at every place we visit, as banks, and wrong interpretation can land anyone into trouble.

- Data protection issues have to be to considered with DNA fingerprinting technology.

Data hacking is turning out to be a big issue these days, millions of individuals have had their data profiles compromised over the past few years.

- The results can still be imperfect even if everything else seems perfect!

There is always a possibility that something could go wrong. An accuracy rate of 99.99% still means that there is an error in every 10,000 cases analyzed.

## CONCLUSION

DNA fingerprinting provides us with an excellent opportunity to make our communities safer and healthier. We can identify criminals and provide justice accordingly. The information stored in DNA databases can help people find lost family members, discover parentage and heritage, and identify and cure genetic health problems.

On the other hand, this technology could also create a very dystopic society where one group of people can target others for selfish, even violent purposes.

The advantages and disadvantages of DNA fingerprinting have shown us that it is possible to learn much more about this technology to make it useful for the society. There is a urgent need of necessary medical interventions and changes in criminal laws, so as to prevent its misuse. DNA fingerprinting might also become the foundation of genetic exclusions in the future, creating a new society according to the DNA profiles of individuals. It is thus a very useful technology, but it is also one that has to be approached with greatest possible caution.

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