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DNA finger printing: A new investigating technique

Dr. Jagdish Kumar
Assistant Professor, M.D. Law PG College, Teen Puli Kaliyan Road, Sri Ganganagar, Rajasthan, India

Abstract
DNA fingerprinting or DNA profiling is becoming a new method of identification that analyses and compares fragments of DNA from separation on independent sources. It is an immensely useful and powerful method of such investigation is based on the premise of comparison of a sample collected from the crime scene and another from the accused. It means that police always need second sources for comparison to already known DNA fingerprint developed from the sample recovered from the place of occurrence.
The DNA finger printing is based on the principle that complete DNA of each individual is distinct. DNA or genetic finger printing is the only definitive positive and permanent identification method of a person as one's DNA neither changes during one's life time nor it can be altered by any method.
The samples to carry out DNA finger printings are obtained from the trace amount of blood, semen or vaginal smear, buccal smear and hair, nail of skin cells.
DNA Technology has been proved to be a boon for innocent suspects, investigating agencies and judges and bane for real culprits whether alive or dead. In several cases DNA came to rescue the innocent convicts by post-conviction DNA tests.

Keywords: DNA finger printing, DNA profiling, investigating technique

Introduction
The existing scenario of criminal investigation and prosecution of criminals, in India, is not in a happy state of an affair. Most of the trials relating to heinous crimes ultimately, end in acquittals. The official figure for the conviction has fallen from about 64.8% in 1961 to about 42.4% in 2005. Moreover, the prosecution agency spends lakhs of rupees on each trail. Consequently, not only a dangerous criminal goes scot-free but at the same time huge amount of public money is also wasted. Furthermore, the frequent acquittals also encourage the criminals resulting in escalation of crimes and multiplication of criminals. The need for the application of modern investigation techniques, therefore, for the effective working of the criminal justice delivery system is urgent and widespread. The technical awareness of an average man has increased manifold in the recent past. The criminals are using the latest innovations of Science no clue or trace at the crime site. The investigation officer, therefore, needs to be equipped with new scientific techniques and methods to combat the modern scientific criminal.

DNA – A New Investigative Tool
The discovery of deoxyribonucleic acid, or DNA, the deciphering of its structure, and the decoding of its genetic information were turning points in our understanding of the underlying concepts of inheritance, Now, with incredible speed, as molecular biologists are unraveling the basic structure of genes, we are able to create new products through genetic engineering and develop diagnostic tools and treatments for genetic disorders. For a number of years, these developments were of seemingly peripheral interest to forensic scientists. All that changed when, in 1985, what started out as a more or less routing investigation into the structure of a human gene led to the discovery that portions of the DNA structure of certain genes are a unique to each individual as fingerprints. Alec Jeffrey's and his colleagues at Leicester University, England, who were responsible for these revelations, named the process for isolating and reading these DNA markers "DNA fingerprinting." As researchers uncover new approaches and variations to the original Jeffrey's technique, the terms DNA profiling and DNA typing have come to be applied to this new technology. The discovery has caught the imagination of the investigation agencies as it links with certainty the origin of biological evidence such as blood semen, hair, or tissue in a single individual.
DNA fingerprinting or DNA profiling is becoming a new method of identification that analyses and compares fragments of DNA from separation on independent sources. It is an immensely useful and powerful method of such investigation is based on the premise of comparison of a sample collected from the crime scene and another from the accused. It means that police always need second sources for comparison to already known DNA fingerprint developed from the sample recovered from the place of occurrence. At the same time matching two samples of DNA and identification of accused on the basis of this test are completely different things. It stills depends upon the fact that whether test his been taken to same the samples from any types of contamination. Also the samples tested must be the same procured from the scene of crime. Further the sample was lawfully obtained from the accused and consequential report is admissible under the law of evidence.

DNA finger printing or DNA profiling

DNA is the fundamental unit of heredity. It instructs the body cells to make proteins that determine everything from hair colour to our susceptibility to diseases. Each gene is actually composed of DNA specifically to designed to carry out a single body function.

The DNA finger printing is based on the principle that complete DNA of each individual is distinct. DNA or genetic finger printing is the only definitive positive and permanent identification method of a person as one's DNA neither changes during one's life time nor it can be altered by any method. Whereas other interiors of identification like picture ID and Fingerprints or thumb expression their termination.

The samples to carry out DNA finger printings are obtained from the trace amount of blood, semen or vaginal smear, buccal smear and hair, nail of skin cells. The "Chemical Scissions" known as restriction enzymes are then used to cut the extremely long DNA at specific points into smaller fragments. Each individual has fixed points where restriction enzyme acts it gives rise to specific pattern of the DNA fragments. These fragments are specific not only in terms of their number but also in term of their length. The DNA molecule being a charged molecule is further subjected to electric current in a jelly like substance (gel electrophoreses) to separate the fragments produced by restriction enzyme. The number and position of the bands formed on the gel is the actual DNA fingerprints. This compared with the control sample taken from the suspects. The DNA pattern as generated is called as "Restriction Fragment Length Polymorphisms (RFLPs).

The RFLP technique can also the used to determine paternity or maternity of an individual, because on inherits RFLP pattern form his or her parents. The patterns are so specific that half of the DNA fragments will be common with that of the father and half with that of the mother. Parental RFLP can also be constructed even if only children's RFLP patterns are available [1].

The other method of testing of DNA known as polymerase chain Reaction (PCR) is used to make millions of exact copies of DNA from a biological sample. This technique allows analysis on samples as small as few skin cells. The PCR consist of series of dots, which indicate presence of specific alleles.

Other technologies in its DNA forensic investigation are SIR, analysis used to evaluate specific region with nuclear DNA. Mitochondria DNA, SIR & Chromosome analysis is useful in racing relationship among males. In all method of DNA analysis adequate precautions and safeguard are required to be applied at the laboratory and the courtroom to meet the ends of justice. Nonetheless DNA fingerprinting has proved to be a valuable tool in the field of forensic investigation of crimes.

Application of DNA Technology

New with the advancement of technology and scientific knowledge it is possible to detect crime and criminals through DNA tasting techniques. DNA testing can establish percentage of a child and solve related problems like inheritance, maintenance and overall basic rights of the child. In crime DNA testing is very useful in identifying the rapist with greater accuracy and conformity. A post conviction test can also some time help in saving the doubtful conviction of a person and may be helpful in his release [2].

DNA data for solving unsolved crimes

When is DNA profile is developed from crime-scene evidence and entered into the forensic crime-scene index of a database, the database software can search thousands of convicted offender DNA profiles (contained in the offender index) of individuals convicted of offenses such as rape and murder. A combined DNA index system can aid investigation by efficiently comparing a DNA profile convicted offender DNA profiles. Forensic evidence from other cases contained in a database system like CODIS can also and investigations by searching the missing persons index which contains DNA profiles of unidentified remains and DNA profiles of relatives of those who are missing. Because of the recidivistic nature of violent offenders, the utility of a DNA database system is evident not only in the success of solving crimes, but also in the prevention of crime. Properly documented, collected, and stored, DNA material can be analyzed to produce a reliable DNA profile, even decades after it is collected. Just as evidence collected from a crime that occurred yesterday can be analyzed for DNA today, evidence from an old rape kit, bloody shirt, or stained bedclothes may contain a valuable DNA profile. The new analysis techniques, in combination with an evolving database system, make a powerful argument for the re-evaluation of unsolved crimes for potential advantage of powerful DNA analysis techniques by investigating crime scenes with a keener eye toward biological evidence. There is a systematic review of old cases for DNA and other new leads [3].

Recent advancements in DNA technology have improved law enforcement's ability to use DNA to solve old cases. Unsolved cases should be evaluated by investigating both traditional and non-traditional sources of DNA. Valuable DNA evidence might be available that previously went undetected in the original investigation. Original forensic applications of DNA analysis were developed using a technology called Restriction Fragment Length Polymorphism (RFLP). Because RFLP analysis required a relatively large quantity of DNA for testing, it may not have been successful. Similarly, biological evidence deemed insufficient in size for testing may not have ben previously submitted for testing. Also, if a biological sample was degraded by environmental factors such as dirt, RFLP analysis may have been unsuccessful at yielding a result in such cases. Newer technologies could now be successful in obtaining result. Newer DNA analysis techniques enable laboratories to develop profiles from biological evidence invisible to the naked eye, such as skin cells left on ligatures or weapons.

Customized system that can automate much of the process, at a DNA Data Bank is flexible enough to handle a large number of samples per year. This will be achieved with robotic equipment that performs nearly all the time-consuming work, and a Sample Tracking and Control System (ST & CS) that handles all sample traffic and controls the robots. Scientists have already started tests on a new sample collection card made of specially treated paper that bonds biological material to its surface, neutralizes bacterial and viral contamination, and can be stored at room temperation [4]. Research and

development of tools that will permit crime laboratories to conduct DNA analysis quickly is vital to the goal of improving the timely analysis of DNA samples. Smaller, faster, and less costly analysis tools with reduce capital investments for crime laboratories while increasing their capacity to process more cases. The development of 'DNA chip technology' that uses nanotechnology to improve both speed and resolution of DNA evidence analysis will reduce analysis time from several hours to several minutes and provide cost-effective miniaturized components.

Conclusion

DNA Technology has been proved to be a boon for innocent suspects, investigating agencies and judges and bane for real culprits whether alive or dead. In several cases DNA came to rescue the innocent convicts by post-conviction DNA tests. They were failed on the basis of available false evidence but DNA technology helped them to prove their innocence. In other words, DNA evidence is also known as justice through Advance Science, because biological evidence can't be tampered and it can never tell lie. In U.S.A. as many as of cases were highlighted by Attorney General, who were earlier convicted but were released after DNA test revealed their innocence. All theses exonerated persons had already served an average of many years prison terms. The release of jailed persons on the basis of Advance Scientific Technology has established the importance of DNA tests.

It is submitted that the growing use of DNA tests has loved many complicated cases and it is the science of 21st century which is accepted globally. This latest technique has emerged as most reliable, accurate and errorless method for solving a complicated case. Every person has a unique DNA which cannot be changed by means of any surgery or other technique; hence, it is very useful for the investigators and Courts in solving criminal cases and cases of paternity disputes.

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