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DNA FINGER PRINTING

Vaishali Patel[1], Rashmi[2], Deepali Raghav[3]

[1,2,3]Department of Zoology
Rajshree Institute of Management and Technology, Bareilly(India)

I.INTRODUCTION

Conventional fingerprint of an individual comes from finger tip & unique for an individual. Fingerprint is used identification of a person in forensic lab, police station etc.However,the major drawback of the conventional fin gerprints is that it can be changed by surgery. There is another type of fingerprint unique to an individual called DNA fingerprint. This remains same in all body parts, tissues and cells as well as cannot be altered by any kno wn methods.Thus,DNA fingerprint method is becoming primary method for identifying an individual because it cannot be altered by any known methods.

II.REVIEW OF LITERATURE

The DNA of every human being on the planet is 99.9% same. Due to mutation,0.1% of DNA out of 99.9% is unique to the individual that makes all the differences. These are a consequence of mutations during evolution. As single change in nucleotide may make a few more cleavage site of a given nucleotide or might abolish some existing cleavage site. The DNA of any individual is digested with a restriction enzyme, fragments pattern (siz es) will be produced and will be difference in cleavage site position. This is the basics of DNA fingerprinting. The DNA profiling of each individual is unique because of the diverse in polymorphic regions present in genom e of every individual. These polymorphic regions used for identification are the non-coding regions of the ge nome. The polymorphic regions of the DNA do not code for proteins and which make up 95% of our genetic DNA.Hence these regions are therefore called the “junk DNA”.Although these “junk DNA” regions do not cod e for proteins, they are involved in regulating gene expression, they help in reading of other genes that code for proteins and are a large portion of the chromosome structure. The junk DNA regions are made up of length poly morphisms, which show variations in the physical length of the DNA molecule.

III.METHODOLOGY

The diagnosis of DNA is a laboratory process which requires a number of sequential steps. There various techni ques used by various laboratories in analyzing DNA.However, the two most powerful techniques used are restr iction fragment length polymorphism(RFLP),and polymerase chain reaction(PCR) using short tandem repeats (STRs).DNA extraction and purification is the first step involved in both the techniques. Techniques for DNA i solation depend on the type of sample used for isolation. Generally the sample may be treated with detergent th

at degrades protein and not affecting the DNA.To break the proteins and other cellular material, enzymes can be used.DNA can be separated using organic solvents from organic and non organic material.

The two types of DNA fingerprinting tests: RELP and PCR/STR

Restriction fragment length polymorphism(RFLP) & polymerase chain reaction (PCR) amplification of short tan dem repeats (STRs).Other diagnosis methods exist, but they lack accuracy and precision.

Restriction fragment length polymorphism (RFLP):

The RFLP is considered to be more accurate than the PCR,mainly because the size of the sample used more, use of a fresh DNA sample, and no amplification contamination. The RFLP, however , require longer time period to complete the analysis and is costly. The first step in this process is to isolate the DNA from the sample mat erial to be tested. As mentioned, the sample size for RFLP test must be large enough to get the proper result. On ce the required size of the sample is available, the DNA is isolated from the sample and is subjected to restrict ion digestion using restriction enzymes. The digested DNA sample is then separated by agarose gel electrophore sis. The next step is transfer of separated DNA from gel slab onto the nitrocellulose membrane to hybridize w ith a labelled probe that is specific for one VNTR region. This technique of transferring and hybridizing DNA in to nitrocellulose membrane is known as southern blotting, a most widely used DNA detection technique. Now these bands when compared with the other known samples, will give the final result of the DNA fingerprinting.

Restriction fragment length polymorphism(RFLP): is a diagrammatic representation of sequential step s involved in DNA finger printing using RFLP.

Polymer chain reaction(PCR) amplification of short tendom repeats(STRs):

PCR generates the repeated copies of a specific area of the DNA fragment. These area are the alleles and are spe cific sequences of base pairs. They are the target regions with variable length. On either side of the target region s there are “flanker” sequences which are non variable length regions. On chromosomes “flanker” occurs at same location for all individuals. Thousand copies of a particular region are amplified by PCR which forms the basis of the detection.STR with a known repeat sequence is amplified and separated using gel electrophoresis. The distance migrated by the STR is examined. For the amplification of STRs using PCR, a short synthetic DN A, called primers are specially designed to attach to a highly conserved common non variable region of DNA th at flanks the variable region of the DNA. By comparing the STR sequence size amplified by PCR with the other known samples, will give the final result of the DNA fingerprinting.

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IV.APPLICATIONS OF DNA FINGERPRINTING

1. In forensics science:

The DNA profile of each individual is highly specific. Biological materials used for DNA profiling are: blood , hair, saliva, semen, body tissue cells etc.

2. Paternity and maternity determination:

A person accedes to his or her VNTRs from his or her parents. Parent-child VNTR prototype analysis has bee n used to solve disputed cases. Information can also be used in inheritance cases, immigration cases.

3. Personal identification：

This concept of using DNA fingerprints as a sort of genetic bar code to pinpoint individuals.

4. Diagnosis of inherited disorders：

It is also useful in diagnosing inherited disorders in both prenatal and new born babies. These disorders may hae mophilia, huntington's disease, familial Alzheimer's, sickle cell anaemia, thalassemia, and many others.

5. Development of cures for inherited disorders:

By studying the DNA fingerprints of relatives who have a history of some particular disorder,DNA prototype as sociated with the disease can be ascertained.

6. Detection of AIDS:

By comparing the band of HIV "RNA"(converted to DNA using RT-PCR) with the bands form by the man's bl ood, person suffering with AIDS can be identified.

6. Breeding program:

Breeders conventionally use the phenotype to evaluate the genotype of a plant or an animal. It is basically useful in breeding race horses and hunting dogs.

V.CONCLUSION

Twenty years after the development of DNA fingerprinting, DNA analysis remain the key to linking suspects to biological evidence and to identifying individual in crimes and disasters. Another important use is the establish ment of paternity in custody and child support litigation.DNA profiling is used to diagnose inherited disorder a nd human diseases.

The list of additional uses for DNA fingerprinting continues to grow. For example : DNA markers have proven to be powerful in the study of population genetics. Molecular markers are use to detect sudden changes in popul ations, effect of population fragmentation, and interaction of different populations.