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18/MHS07 /005

PHARMACOLOGY

Question : explain the application of DNA fingerprinting in medical biotechnology

DNA fingerprinting is a molecular genetic method that enables the identification of individuals using hair, blood, or other biological fluids or samples. This is able to be accomplished due to unique patterns (polymorphisms) in their DNA. It is also known as genetic fingerprinting, DNA typing, and DNA profiling.When used for forensic science, DNA fingerprinting makes use of probes that target regions of DNA specific to humans, thus eliminating any possibility of contamination by extraneous DNA from bacteria, plants, insects, or other sources

Different DNA fingerprinting methods exist, using either restriction fragment length polymorphism (RFLP), polymerase chain reaction (PCR), or both.

Each method targets different repeating polymorphic regions of DNA, including single nucleotide polymorphisms (SNPs) and short tandem repeats (STRs). The odds of identifying an individual correctly depends on the number of repeating sequences tested and their size

The techniques used in DNA fingerprinting also have applications in paleontology, archaeology, various fields of biology, and medical diagnostics. It has, for example, been used to match the goatskin fragments of the Dead Sea Scrolls. In biological classification , it can help to show evolutionary change and relationships on the molecular level, and it has the advantage of being able to be used even when only very small samples, such as tiny pieces of preserved tissue from extinct animals, are available.

Fields Where DNA Fingerprinting Is Beneficial

1. Genetic fingerprinting can be used in criminal forensic investigations. A very small quantity of DNA is reliable enough in identifying individuals involved in a crime. Similarly, DNA fingerprinting can and does exonerate innocent people of crimes—sometimes even crimes committed years ago. DNA fingerprinting can also be used to identify a decomposing body.

2. DNA fingerprinting can answer the question of the relationship to another person quickly and accurately. In addition to adopted children finding their birth parents or settling paternity suits, DNA fingerprinting has been used to establish a relationship in cases of inheritance.

3. Another important instance is identifying good genetic matches for organ or marrow donation. Doctors are beginning to use DNA fingerprinting as a tool for designing personalized medical treatments for cancer patients. Moreover, the process has been used to ensure that a tissue sample has been correctly labeled with the patient's name.
4. DNA fingerprinting is a powerful tool for the pediatrician in cases of physical and sexual abuse and when issues arise regarding identification and familial relationships. If this technology is to be utilized effectively, the physician must know how to collect and document specimens.
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8. Match tissues of organ donors with those of people who need transplants.
9. Identify diseases that are passed down through your family.
10. Help find cures for those diseases, called hereditary conditions.
11. Personal Identification: The notion of using DNA fingerprints as a sort of genetic bar code to identify individuals has been discussed, but this is not likely to happen anytime in the foreseeable future. The technology required to isolate, keep on file, and then analyze millions of very specified VNTR patterns is both expensive and impractical. Social security numbers, picture ID, and other more mundane methods are much more likely to remain the prevalent ways to establish personal identification.
12. Study biodiversityof species