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**COLLEGE: MEDICINE AND HEALTH SCIENCES**

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**COURSE TITLE: INTRODUCTION TO BIOTECHNOLOGY**

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**ASSIGNMENT: EXPLAIN THE APPLICATION OF DNA FINGERPRINTING IN  
MEDICAL BIOTECHNOLOGY.**

## APPLICATIONS OF DNA FINGERPRINTING IN MEDICAL BIOTECHNOLOGY

DNA is short for deoxyribonucleic acid which is inside every cell in the body. It's chain of chemical compounds that join together to form permanent blue prints for life. These compounds are called bases, there are 4 in number. They pair up with another to form base pairs. DNA has about 3 billion of these base pair. The complete set of the compounds is known as genome. More than 99.9% of everyone's genome are exactly alike and 100% if they are identical twins but the tiny bit that's not exact is what makes you physically and mentally different from someone else. DNA fingerprinting is a technique used especially for identification by extracting and identifying the base-pair pattern of an individual's DNA. It is also called DNA typing or genetic fingerprinting. It is a chemical test that is used to show the genetic make-up of a person or other persons. DNA fingerprinting is used as evidence in court, to identify bodies, track blood relatives and to look for the cure for disease. DNA fingerprinting is the process of determining an individual's DNA characteristics. DNA fingerprinting is a molecular genetic method that enables the identification of individuals using hair, blood or other biological fluids or samples. DNA fingerprinting uses chemicals to separate strands of DNA and reveals the unique parts of your genome. Some of the areas where DNA fingerprinting is applied in

medical biotechnology:

- **DNA fingerprinting is used to establish paternity:** It is used to determine whether an individual is the biological parent of another individual. All individual excluding identical twins have a unique set of DNA. Therefore a blood sample, hair, saliva, can be taken from a person and the DNA of that person can be extracted and then used for various test. Genetic testing is the most reliable standard, older methods also exist including ABO blood group typing, analysis of various other protein and enzymes or by using human leukocytes antigens/ antibodies. The current technique for paternity testing uses polymerase chain reaction (PCR) and restriction fragment length polymorphism (RFLP). Paternity testing can also be performed while the woman is still pregnant, from a blood draw. In a DNA paternity test, the result is 0% when the alleged parent is not biologically related to the child but when the result is 99.9% when the alleged parent is biologically related to the child. This test is also applicable for the maternity testing of a child but it is majorly used for paternity test because women carry the baby. In cases where some complications may happen such as in-vitro fertilization then this test may be used to check and confirm the parents of the child.

- **DNA fingerprinting is used to identify a dead body:** DNA fingerprinting is use to identify dead bodies that are too old or damaged to be recognized, through the applications of biotechnological machineries. The anatomist identify different dead bodies through the application of medical biotechnology and they are then handed over to their various families.
- **DNA fingerprinting is applied in the process blood transfusion:** for blood transfusion to occur, compatibility test has to be carried out on the donor and receptor blood types. Medical biotechnological machineries are used to check the compatibility of the blood types and to check the presence of any disease in or from the donor to see if the blood transfusion can occur. These machineries make the result gotten from this process fast and reliable.
- **DNA fingerprinting is applied in tissue/organ transplant:** Organ rejection is a common problem after tissue/organ transplant. Only

50% of the patients are alive 10 years after the procedure and transplant patients must undergo constant monitoring for signs of organ rejection. A new test could provide a non-invasive way of monitoring tissue/organ transplant patients for organ rejection. The test relies on DNA sequencing to detect fragments of the donor's DNA in the recipient blood. Although it still needs to be validated in clinical trials but physicians hope it will ultimately offer an easy way to detect the signs of organ rejection in all types of transplant patients.

- **DNA fingerprinting is necessary in the identification of hereditary conditions:** DNA fingerprinting is used to identify the genetic make-up of an individual so it can be used to identify an hereditary condition in a family through the knowledge of that families genetic make-up.
- **DNA fingerprinting helps to find cure for hereditary diseases:** Since an hereditary condition can be discovered through DNA fingerprinting, the cure can also be made through the knowledge gotten from the DNA of the individual or family.

- **DNA fingerprinting is applied in pregnancy scans:** DNA fingerprinting is applied in pregnancy scans for various tests like to check the paternity of the child, the child's sets of chromosomes, the health of the child and mother due to the current situation which is pregnancy.
  
- **DNA fingerprinting is applied in autopsy:** DNA fingerprinting is used to discover the genetic makeup of a person. Anatomist can apply it in autopsy to discover the causative measures of a person's death. In developed countries, sudden cardiac death is one of the most common cause of death and tragically thousands of people younger than 40 years die suddenly each year. Fortunately, in many cases, the cause and manner of death can be established from comprehensive medicolegal investigation including autopsy. For nearly half of young victims from 1 to 35 years of age, there are no warning signs and sudden death often occur as the sentinel event, thus placing the extreme significance on the medicolegal investigation and autopsy to determine the cause and manner of the death. A post modern examination may detect a non cardiac basis for the sudden death such as asthma, epilepsy or pulmonary embolism. However, sudden

cardiac death is the predominant cause of sudden death in young people with structural cardiovascular abnormalities often evident at autopsy.