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REVIEW ARTICLE

USE OF DNA IN HUMAN IDENTIFICATION: FROM SKIN TO GENES

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ABSTRACT

This article is based on 'use of Deoxyribonucleic Acid (DNA) in human identification, from skin to genes'. DNA has been used as a vital element in the identification of the individuals on the basis of the human genes. The study is based on secondary data analysis. The sources were analyzed critically, and information relevant to the research was extracted. Many different kinds of libraries, journals and articles were reviewed in order to gain extensive insight about the proposed study. Some of the databases include Google scholar, sage publications and other relevant websites. Today, the accuracy of DNA tests requires a commitment to quality scientific excellence, since the results may be crucial for resolving cases of child custody, inheritance, assaults, identification of biological remains or finding the missing link in searching the lineage of an adopted.

KEY WORDS: Deoxyribonucleic Acid(DNA); Chromosomes.

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INTRODUCTION

DNA has been used as a vital element in the identification of the individuals on the basis of the human genes. The accuracy of the identification of an individual is extremely accurate through the DNA. DNA is a deoxyribonucleic acid which is contained by every individual and forms the basis of the identification of an individual. Genetic information represented through DNA segments is called genes. DNA is made up of two long polymers called nucleotides which involve a backbone made up of sugar and phosphate. These are anti parallel as they run in opposite directions. First being three prime and the other one being forth prime. The sequence of backbones helps to identify the information. Genetic code is helpful to read out such information. The order of the information is helpful to build and maintain an organism. The development of such a society is found to be safe and secure in terms of giving healthy information of DNA reports of identifications of the individuals.[1]

DNA technology consists of chemical manipulation of genotypes and phenotypes of organisms. Scientists have revolutionized DNA technology to study genetics, ecology, and evolutionary biology of organisms, biochemistry, and also help develop novel biological products. Cloning is the creation of an exact genetic copy of an organism, which means that the DNA make up is exactly the same. Today, society uses cloning to genetically modify plants and animals to produce food. Cloning is used to replicate endangered animals and to harvest specific organs as well as to produce cures for diseases and prevention of diseases. Gene therapy consists of using genes to prevent or treat disease in experiments.[2]

When the cell is undergoing division or mitosis, the chromatin condenses, forming sharp structures, which are the chromosomes. Every cell of a person's body has the same DNA. DNA is found mostly in cell nucleus. Adenine, guanine, cytosine and thymine are the four chemical bases in which DNA information is stored as a code. Adenine pairs with thymine and cytosine are paired with the guanine. This sequence in a DNA molecules is defined as genes. People usually have the same bases of DNA as others. DNA has a special property of replicating. It can make the copies of its own. DNA forensic has been classified as a branch of science that contributes towards the use of genetic information in criminal investigation in order to find the answers that lead to legal situations such as criminal and civil cases.[3] DNA analysis technology has being used among every nation of the world as an established technology. A managed laboratory environment along with the large size equipment equivalent to a small refrigerator is required in order to perform DNA analyses. Analysis time of DNA is almost about half a day.[4]

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Although DNA analysis provides personal identification but the large equipment and the managed laboratory environment has made it difficult to perform DNA analyses effectively. This development of DNA analysis system has been going on at NEC. This development is done by creating a comparison of DNA system with finger print, palm print and face matching systems. This development is expected to make great contribution in building a safer and secure DNA analyses system in future.[5]

This study carries huge significance as gene identification methods usually use different measurements as evidence for a new gene; therefore, all information has to be combined to give the most likely gene structure.[6,7]

DNA has been long used for the tracking of the crime and to solve the mystery behind the problem which has arisen. The DNA has been used a tool for the forensic specialists to extract the information regarding, who has been involved in the crime committed.[12] Forensic sciences is a field of science which deals with the purposes of law and provides a scientific impartial evidence for the use of law/court, like for instance, trial and criminal investigation. The Criminal activities are tracked by the crime scene investigators who are perfect and experiences in knowing and tracking the information required for the proofing purposes. The evidences found are extracted by means of different technologies used nowadays. The use of technology which are commonly used and known to most of us are, chromatography which identifies the seized drugs, the DNA profiling which helps in the identification the murder's suspects found at the crime scene from the bloodstream, and the identification of the microscopic fragments of paint by means of the laser raman spectroscopy.[11-15]

HUMAN DNA IDENTIFICATION: APPLICATIONS AND LIMITS

One of the most important technical developments in the field of human identity testing is the use of the characterization of DNA from biological evidence. Thus, many human remains consisting only of bones have been successfully identified in this manner. Genes are DNA sequences located in specific sites of the chromosomes constituting its functional unit.[16]

However, both are difficult to study in humans. Traditionally one compares them with parents looking for mutations and recombination sites. For this type of experiment, about ten thousand children would have to be used to reliably detect a mutation or recombination in a gene. Alec Jeffrey's solved this problem by developing alternative methods to detect these changes, not processes in children, but the examination of millions of sperm. Utilizing this strategy, he revealed the complex way in which mini-satellites mutate.[17-19] There are procedures that can minimize the action of these DNA degradation factors. However, great care must be taken to avoid misinterpretations.[20-22]

RESEARCH DESIGN

This research is founded on the secondary data from publications, articles and similar studies accessible on the internet. A qualitative method was selected since the topic is exploratory in nature. Secondary analysis is conducted in this research to gain an understanding of the use of DNA in human identification: from skin to genes. The Secondary data analysis involves the collection and analysis of a vast array of information.[24] With the help of qualitative research, the researcher can provide and analyze the in depth analysis of the complex questions.[25] It was ensured that data is accurate, and is without errors. The data was relevant to the topic of the research. [26, 27] Obligation for all processes and ethical consequences associated with the research remains with the primary researchers. [28,29]

DISCUSSION AND FINDINGS

The genome consists of giant DNA molecules, associated with other types of molecules to form protein named chromosomes. A human being has 23 pairs of chromosomes, thus two complete sets of instructions, each inherited from a parent.[1] According to Adams et.al.[2] nucleus of a human cell is contained with 46 individual chromosomes.

DNA identification is used to help solve crimes and determine paternity, and also to locate segments of genes for genetic diseases, map the human genetic material and develop drought-resistant plants, and produce biological drugs from genetically modified cells.[30,31] In practice, during the genetic typing to identify the person or the degree of genetic relatedness (proximity or remoteness) comparing DNA profiles of several biological samples and evaluate the result obtained using probabilistic and statistical analysis.[32,13]

This use of DNA modification in agriculture seems like a solution to a globe of problems, but much of the quality of our food has diminished. Many researchers debate that troubles have arisen to include an increase in cancer cells, possible links to autism, and various other genetic occurrences in the population.[6] Unlike soft tissues, teeth have an outer enamel matrix which is tough and resistant to degradation effects inflicted by decaying of organic matter and postmortem putrefaction.[13] Most DNA extraction methods involve spraying bone bone decalcification in EDTA and the subsequent use of a standard DNA extraction method.[12]

Biologists are beginning to use DNA fingerprinting to ensure that breeding endangered animals is between genetically unrelated individuals to each other, not related. To stimulate the genetic mix in the offspring, and a fundamental evolutionary mechanism of the

genetic defense. Paleontologists, evolutionary biologists and anthropologists also exploit the technique. Scientists can establish through DNA fingerprinting, evolutionary relationships between different species has been shown, for example, that mammoths are more closely related to elephants than was thought a few years ago. Anthropologists can still drift locations, times and roads that followed the distribution of humans across the planet. New applications of the technique are continually being tested and, surely, will be developed further in the near future.[11]

Another powerful and recent molecular biological method, also described in 1985, the chain reaction of DNA polymerase (PCR) can be combined with the technique of genetic fingerprinting. CPR can copy many a tiny DNA sample: increases the original amount in millions of identical copies. The enormous potential of research of these residues is evident.[33]

Today, society is experimenting with gene therapy to introduce a new gene in the body to fight a disease. Introducing a new healthy gene to take place of a mutated gene that causes disease is a new form of technology to help prevent and cure diseases. Stem cell research takes primitive human cells and develops them in the body with the 220 variety of cells that include brain cells and blood cells. Today, society uses stem cells to treat a variety of blood and bone marrow diseases, such as immune disorders and blood cancers. Genetically modified foods are foods that are developed from genetically modified organisms such as genetically modified crops.[9] We can see that DNA technology and its application has come a long way and has raised not only our understanding and knowledge in the subject but also the ethical dilemmas that come with that and the controversy that follows its applications. We have discussed the many good results that can come from cloning, gene therapy, and stem cell research as well as some of the ethical dilemmas that are putting pressure on scientist as well as government as to what is acceptable ethical research. As we move forward as a society it is also important that we continue to gain knowledge and develop DNA technology that will help for the betterment of the human race.[6]

CONCLUSION

It can be concluded from this comprehensive study that nucleus of a human cell is contained with 46 individual chromosomes. Among these 46 chromosomes, half of the chromosomes are inherited from the father and half of them from the mother. However, there is no such possibility to evaluate that which chromosome belongs to father or which chromosome relates to mother. Two chain molecules compose every piece of chromosome. The length of DNA is dependent on the chromosomes. Today, the accuracy of DNA tests requires a commitment to quality scientific excellence, since the results may be crucial for resolving cases of child custody, inheritance, assaults, identification of biological remains or finding the missing link in searching the lineage of an adopted. Microsatellites are a repeated sequence of human chromosomes. They play a major role to identification of human through use of DNA analysis. This is clear that blood type or disease information is different from the human DNA analysis information of an individual. Microsatellites use 4 or 5 base pairs in human DNA analysis. Analyzing genes is used to perform the comparison of DNA profiling with the human individual identification.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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