



THE USE OF DNA EVIDENCE IN CRIMINAL INVESTIGATIONS

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DOI - 10.5281/zenodo.8350177

ABSTRACT:

The use of DNA evidence has revolutionized criminal investigations worldwide. DNA evidence can be obtained from various biological materials and can provide a unique identification of individuals involved in a criminal act. The use of DNA evidence has led to the exoneration of innocent individuals and the conviction of guilty ones. In this article, we will review the literature on the use of DNA evidence in criminal investigations, discuss the methodology used to obtain and analyze DNA evidence, and examine the results obtained from the use of DNA evidence in criminal investigations.

INTRODUCTION:

DNA evidence has become an increasingly important tool in criminal investigations, and its use has had a significant impact on the criminal justice system. DNA evidence can provide a unique identification of individuals involved in a criminal act, which can be used to either exonerate or convict individuals accused of crimes. DNA evidence can be obtained from various biological materials, such as blood, semen, saliva, and hair, and can be analyzed using various methods, including polymerase chain reaction (PCR) and short tandem repeat (STR) analysis.

The use of DNA evidence in criminal investigations has led to the exoneration of innocent individuals and the conviction of guilty ones. In addition, DNA evidence has helped to solve cold cases that were previously unsolved due to the lack of forensic evidence. DNA evidence has also helped to identify perpetrators of crimes, even when there were no eyewitnesses or other physical evidence.

REVIEW OF LITERATURE:

The use of DNA evidence in criminal investigations has become a popular topic of research, and numerous studies have been conducted to examine its effectiveness. According

to a study conducted by the Innocence Project, DNA evidence has helped to exonerate 375 individuals in the United States who were wrongfully convicted of crimes, including 21 who were on death row (Innocence Project, 2021). DNA evidence has also led to the conviction of numerous individuals who were guilty of crimes.

The use of DNA evidence in criminal investigations has been found to be highly accurate and reliable. According to a study conducted by the National Institute of Standards and Technology (NIST), the probability of a DNA match being coincidental is less than one in a billion (NIST, 2017). DNA evidence has also been found to be highly resistant to contamination and degradation, making it a valuable tool for forensic investigations.

The use of DNA evidence in criminal investigations has also been found to have a significant impact on the criminal justice system. According to a study conducted by the National Institute of Justice (NIJ), the use of DNA evidence has led to a decrease in crime rates and an increase in the number of guilty pleas (NIJ, 2015). DNA evidence has also been found to be cost-effective, as it can help to reduce the time and resources required for investigations.

METHODOLOGY:

The collection and analysis of DNA evidence is a complex process that requires meticulous attention to detail and adherence to strict protocols. The methodology used in DNA analysis includes several key steps, each of which is critical to the overall accuracy and reliability of the results.

COLLECTION OF BIOLOGICAL MATERIAL:

The first step in the process of DNA analysis is the collection of biological material from the crime scene or from individuals who may have been involved in the crime. Biological material can be collected from various sources, such as blood, semen, saliva, and hair.

It is essential that the collection of biological material is performed carefully to avoid contamination and ensure the integrity of the evidence. Collecting biological material at the crime scene must be done with sterile instruments to avoid contamination with other genetic material. The collection of biological material from individuals, such as suspects or victims, should be done with the appropriate consent and following the necessary protocols.

TRANSPORTATION AND STORAGE:

Once the biological material has been collected, it must be properly transported and stored to maintain its integrity. Biological material should be stored in sterile containers to avoid contamination and in a manner that will prevent degradation, such as refrigeration or freezing.

Analysis of DNA Evidence:

The analysis of DNA evidence involves several steps, including DNA extraction, PCR amplification, and STR analysis. The first step is DNA extraction, which involves separating the DNA from other biological materials, such as proteins and cellular debris.

After DNA extraction, PCR amplification is used to create multiple copies of the DNA sample. The process of PCR amplification involves heating and cooling the sample to promote the duplication of DNA segments.

STR analysis is used to identify the unique genetic profile of an individual. STRs are short tandem repeat sequences that are highly variable in the human genome. The number of repeats at each STR locus is used to create a DNA profile that is unique to each individual.

DATA ANALYSIS:

DNA evidence is a powerful tool in criminal investigations, providing a unique genetic profile that can identify individuals involved in a crime or exclude those who were not involved. The analysis of DNA evidence involves several steps, including DNA extraction, PCR amplification, and STR analysis.

DNA extraction involves the separation of DNA from other biological materials, such as blood or saliva. The extracted DNA is then subjected to PCR amplification, which is used to create multiple copies of the DNA sample. This step is important because it allows for the detection of even small amounts of DNA that may be present at the crime scene.

After PCR amplification, the DNA is analyzed using short tandem repeat (STR) analysis. STR analysis compares the number of repeating units at specific locations on the DNA to create a genetic profile for the individual. The genetic profile can be used to identify or exclude individuals involved in a crime.

In addition to identifying individuals, DNA evidence can also be used to calculate the probability of a DNA match being coincidental. The probability of a match is calculated by comparing the genetic profile of the

evidence to the genetic profiles of potential suspects. The likelihood of a match occurring by chance is calculated using statistical analysis, and a match with a probability below a certain threshold is considered to be highly indicative of a match.

The accuracy of DNA evidence analysis is critical in criminal investigations. It is essential that proper protocols are followed during the collection, storage, and analysis of DNA evidence to prevent contamination or errors. The reliability of DNA evidence is further enhanced by the use of multiple samples from different biological sources, such as blood and hair, to provide a more complete genetic profile.

In conclusion, DNA evidence is a powerful tool in criminal investigations, providing a unique genetic profile that can identify individuals involved in a crime or exclude those who were not involved. The accuracy and reliability of DNA evidence analysis are critical to its use in criminal investigations, and proper protocols must be followed to ensure its validity. DNA evidence analysis can also be used to calculate the probability of a match being coincidental, which is important in the identification of suspects.

RESULTS:

The use of DNA evidence in criminal investigations has had a significant impact on the criminal justice system. The accuracy and reliability of DNA evidence have led to the exoneration of numerous individuals who were wrongfully convicted of crimes. The Innocence Project reports that DNA evidence has led to the exoneration of 375 individuals in the United States who were wrongfully convicted of crimes, including 21 who were on death row (Innocence Project, 2021).

In addition, the use of DNA evidence has led to the conviction of numerous individuals who were guilty of crimes. DNA evidence has been used to link suspects to crimes, provide evidence of their involvement, and provide critical information about the crime scene.

The use of DNA evidence has also helped to solve cold cases that were previously unsolved due to the lack of forensic evidence. In some cases, DNA evidence has been the key to identifying perpetrators of crimes that had remained unsolved for years or even decades.

Furthermore, the use of DNA evidence has helped to identify

perpetrators of crimes, even when there were no eyewitnesses or other physical evidence. For example, DNA evidence has been used to identify the remains of individuals who were victims of crime and to provide evidence of their identity and cause of death.

Overall, the use of DNA evidence in criminal investigations has provided a valuable tool for identifying perpetrators of crimes and exonerating innocent individuals. Its accuracy, reliability, and resistance to contamination and degradation make it a valuable tool for forensic investigations.

However, there are also concerns about the misuse of DNA evidence, including privacy concerns and the potential for genetic discrimination. It is important that strict protocols are followed to ensure the proper collection, storage, and analysis of DNA evidence, and that safeguards are in place to prevent its misuse.

CONCLUSION:

In conclusion, the use of DNA evidence has revolutionized criminal investigations, providing a powerful tool for identifying perpetrators of crimes and exonerating innocent individuals. The accuracy, reliability, and resistance

to contamination and degradation of DNA evidence make it a valuable tool for forensic investigations. However, there are also concerns about the potential for misuse and the need for strict protocols and safeguards to protect privacy and prevent genetic discrimination. The use of DNA evidence in criminal investigations will undoubtedly continue to evolve and play a critical role in the criminal justice system.

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