Commentary

iMedPub Journals
www.imedpub.com

Journal of Medical Toxicology and Clinical Forensic Medicine

2023
Vol.9 No.3:57

DNA Profiling in Forensic Investigations

Nabhani Katrin*

Department of Forensic, Norwegian University of Science and Technology, Gjovik, Norway

Corresponding author: Nabhani Katrin, Department of Forensic, Norwegian University of Science and Technology, Gjovik, Norway, E-mail: katrin.nabhani@gmail.com

Received date: August 04, 2023, Manuscript No. IPJMTCM-23-17760; **Editor assigned date:** August 07, 2023, PreQC No. IPJMTCM-23-17760 (PQ); **Reviewed date:** August 21, 2023, QC No. IPJMTCM-23-17760; **Revised date:** August 28, 2023, Manuscript No. IPJMTCM-23-17760 (R); **Published date:** September 04, 2023, DOI: 10.36648/ 2471-641.9.3.57

Citation: Katrin N (2023) DNA Profiling in Forensic Investigations. J Med Toxicol Clin Forensic Vol.9 No. 3:57.

Description

DNA profiling, also known as DNA fingerprinting or DNA typing, is a forensic technology that involves analyzing specific regions of an individual's DNA to create a unique genetic profile. This profile can then be used for identification purposes, such as determining whether a DNA sample collected from a crime scene matches the DNA of a potential suspect or victim. Here's a bit more detail about DNA profiling genetic variation the human genome contains regions that vary among individuals, such as Short Tandem Repeats (STRs) or Variable Number Tandem Repeats (VNTRs). These regions are highly polymorphic, meaning they have different lengths in different people. Sample collection DNA samples can be collected from various biological materials, including blood, semen, hair, saliva, and skin cells. These samples can be found at crime scenes, on objects, or even on clothing. PCR amplification Polymerase Chain Reaction (PCR) is used to amplify the target DNA regions. This makes it possible to obtain sufficient DNA material for analysis even from small or degraded samples. Fragment analysis are amplified DNA fragments are separated based on their lengths using techniques like capillary electrophoresis. The resulting pattern of DNA fragments is the individual's DNA profile. The obtained DNA profile is compared to profiles from known individuals (like suspects or victims) or DNA databases to find potential matches. The likelihood of a random match is calculated based on the frequencies of the observed DNA alleles in the population. This helps determine the strength of the DNA evidence. Forensic experts interpret the results, taking into account the significance of the match, the rarity of the DNA profile, and other relevant factors.

Applications DNA Profiling

Applications DNA profiling is used in criminal investigations to link suspects to crime scenes, identify victims, exonerate innocent individuals, and establish biological relationships (*e.g.,* paternity testing). Cold cases and missing persons DNA databases are used to revisit unsolved cases or identify unidentified human remains. Controversies while DNA profiling is a powerful tool, its use raises concerns about privacy, accuracy, potential misuse, and the ethics of maintaining DNA databases. Technological advancements, such as next-generation sequencing, enable more comprehensive DNA analysis and profiling from degraded or mixed samples. International collaboration DNA databases and profiles are often shared across jurisdictions to aid in cross-border investigations. DNA profiling has revolutionized forensic science and criminal investigations, leading to accurate identifications and solving many cases that would have otherwise remained unsolved. DNA profiling, also known as DNA fingerprinting or DNA typing, is a forensic technology that involves analyzing specific regions of an individual's DNA to create a unique genetic profile. This profile can be used for various purposes, including identifying individuals, determining relationships, and solving criminal cases. Here's how DNA profiling works collection DNA samples are collected from biological materials such as blood, saliva, hair, semen, or tissue. Isolation the DNA is extracted and purified from the collected sample. (PCR) Polymerase Chain Reaction specific regions of the DNA, often Short Tandem Repeats (STRs), are amplified using PCR, which makes copies of the DNA. Electrophoresis are amplified DNA fragments are separated based on size using a technique called gel electrophoresis. This creates a unique pattern of bands. Analysis the resulting DNA pattern is analyzed to determine the number of repeats at each STR locus. This creates a genetic profile specific to the individual. Comparison the genetic profile from the crime scene evidence is compared to DNA profiles from known individuals, such as suspects or victims. Matching if there's a match between the crime scene profile and a known individual's profile, it can provide strong evidence of their involvement in the crime. The frequency of occurrence of certain DNA profiles in the population is calculated. This helps assess the rarity of a given DNA profile and the strength of the match. DNA profiling is widely used in criminal investigations to link suspects to crime scenes, identify victims, and exonerate innocent individuals. It has also been crucial in solving cold cases and identifying unidentified remains. The accuracy and uniqueness of DNA make it a powerful tool for forensic science.

Forensic Technology

DNA profiling, also known as DNA fingerprinting or DNA typing, is a forensic technology that involves analyzing the

© Copyright iMedPub | This article is available from: https://toxicology.imedpub.com/

unique genetic information present in an individual's DNA to establish identity, relationships, and potential involvement in criminal activities. This process relies on the fact that each person's DNA is distinct except for identical twins. Here's how DNA profiling works sample collection of DNA is collected from a biological source, such as blood, saliva, hair, semen, or other bodily fluids/tissues. Isolation of DNA collected sample is processed in a laboratory to extract the DNA. DNA database comparison DNA profile is compared to profiles in a DNA database, which might include profiles from crime scenes, missing persons, and convicted offenders. If a match is found, it could indicate a potential suspect or provide insights into the relationships. Forensic interpretation experts analyze the DNA profile data and determine the significance of the match. Statistical calculations are often used to estimate the rarity of the DNA profile in the population. Court presentation if the DNA evidence is relevant to a criminal investigation, it can be presented in court as evidence to establish a link between the suspect and the crime scene. DNA profiling has revolutionized forensic investigations by providing a highly accurate and reliable method for identifying individuals, solving cold cases, and exonerating innocent individuals. It solving crimes and preventing wrongful convictions.