

Dna analysis and codis essay



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Most people have heard of DNA. If not on the current, popular television shows like CSI, then most likely on the plethora of shows that display crime cases that are real. Nowadays, DNA analysis is considered the paramount method in determining biological relationship as well as a key component in solving crimes. Because everyone's DNA is unique, it is the most effective way guarantee authenticity when one has been accused of a crime. In order to obtain info, detectives must use a data bank to retrieve necessary information. To understand why a DNA data bank is necessary it is important to know exactly what DNA is.

Firstly, there are cells which makes up all organisms and inside these cells are chromosomes. Chromosomes, which are made up of DNA, contain all the hereditary information that an individual has. Now this DNA (Deoxyribonucleic acid) which makes up these chromosomes simply contains the blueprints of the organism. It is DNA which determines what, where, and when to make a certain protein, and it basically is the storage center for information in almost all creatures. This knowledge of DNA is important because now it is possible to show the correlation between DNA and forensic technology.

Over 30 thirty states have their own DNA databases and the FBI has a national database named Combined DNA Index System(CODIS), and it includes the DNA databases of all states that currently have one. Most of our DNA is identical to DNA of others. However, there are inherited regions of our DNA that can vary from person to person. Variations in DNA sequence between individuals are termed polymorphisms. Sequences with the highest

degree of polymorphism are very useful for DNA analysis in forensics cases and paternity testing.

This activity is based on analyzing the inheritance of a class of DNA polymorphisms known as "Short Tandem Repeats", or simply STRs. Short tandem repeat (STR) in DNA is a group of polymorphisms that occur when two or more nucleotides are repeated as well as those repeated sequences are directly adjacent to one another. This pattern can range anywhere from two to ten base pairs. By examining enough STR loci and counting how many repeats of a specific STR sequence there are at a given locus, it is possible to create a unique genetic profile of an individual.

There are currently over 10,000 published STR sequences in the human genome. STR analysis has become the prevalent analysis method for determining genetic profiles in forensic cases. STR analysis has only been around for approximately ten years in the field of forensics. It is used for genetic fingerprinting of individuals. The STR's that are used for forensic analysis are only tetra or penta (4 or 5) nucleotide repeat units. These are used because they offer more error free data and are capable of surviving degradation over time.

This includes exposure to very hot/cold elements, extremely long periods of time, and placement in under any other non idyllic conditions. In the United States, 13 core STR loci have been decided upon to be the basis by which an individual genetic profile can be generated. These profiles are stored on a local, state, and national level in DNA databanks such as CODIS. All CODIS

STRs are tetrameric repeat sequences and all forensic laboratories that use the CODIS system can contribute to a national database.

There are many advantages to the CODIS STR system including: STR profiles can be determined with minimal amounts of DNA, all data are digital and ideal for computer databases, labs all over the world can contribute to the analysis of STR allele frequency in different human populations, STR alleles are discrete and behave according to known principles of population genetics and can be rapidly determined using commercially available kits, and the CODIS system has been widely adopted by forensic DNA analysts.

For each of the 13 genetic loci, a genotype is determined. The genotype is the allelic makeup of an individual such as homozygous dominant and recessive and heterozygous. Then the expected frequency of his genotype at each locus in a representative population sample is determined. By combining the frequency information for all 13 CODIS loci, one can calculate the frequency of a person's genetic profile for example, 1 in 5 trillion Caucasians. Because there are fewer than 6 billion people on this planet.

DNA profiles can be instrumental in finding definitive matches that no one else can possibly share with the exception of an identical twin. This complicated world of DNA coding has been a lifesaver to those in law enforcement. Many years ago, criminals would be set free due to lack of eyewitness accounts or fingerprints. Nowadays, a simple fiber, strand of hair, saliva, or blood sample can yield DNA results that are undeniable in a court of law.

The advantages of CODIS and other databases are overwhelming. The instant access to information can help in the quick apprehension of a criminal, the fact that it is much easier to identify repeat offenders in order to prevent future crimes, and the data base can also effectively eliminate suspects and end false arrests. Society greatly benefits from a DNA database of convicted criminals. There is nothing else like it in the fight against crime!