

# Difference Between Gene Sequencing and DNA Fingerprinting

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## Key Difference – Gene Sequencing vs DNA Fingerprinting

Sequencing of DNA is an important technique in molecular genetics where the nucleotide sequence of a particular DNA sequence or the whole genome of an organism is determined. This enables the researcher or the diagnostician to determine the mutations of DNA sequences and to distinguish one organism from another based on their genetic composition. **Gene sequencing is the sequencing procedure of a gene or a DNA fragment via Sanger sequencing or Next generation sequencing. DNA fingerprinting involves a technique known as **Restriction Fragment length polymorphism (RFLP)**, where DNA samples of two or more subjects are fragmented and analyzed to determine the identity of a person.** This is the key difference between gene sequencing and DNA fingerprinting.

## What is Gene Sequencing?

Gene sequencing is done to determine the nucleotide sequence of a particular gene. If the whole genome is sequenced, it is referred to as Whole Genome sequencing. Initially, gene sequencing was done using chemical methods which used harmful chemicals such as Pyridine; this technique was soon discontinued due to the toxic nature of the experiment. At present, sequencing of a gene is mostly done using a method known as Sanger sequencing, which utilizes a chain termination step by deoxyribonucleic acids. The reaction is carried out in four separate test tubes where in each test tube the primer is labeled using a fluorescence marker which will finally determine the sequence of the particular fragment. Automated Sanger sequencing uses a detector to detect the fluorescence signals and deliver the results.

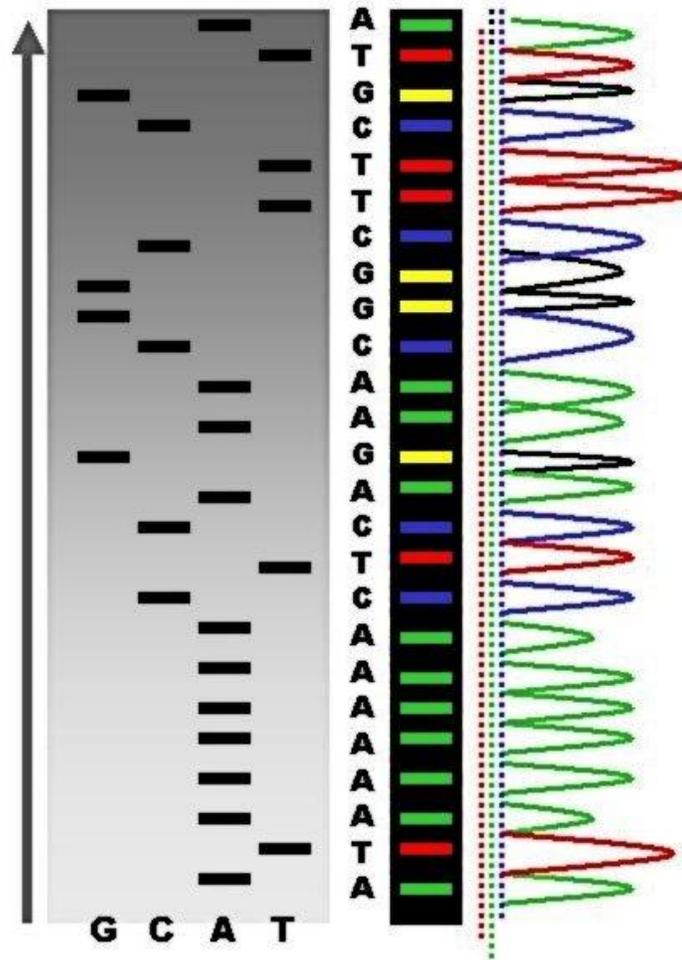


Figure 01: DNA Sequencing

Next Generation sequencing is the most recent development of sequencing methods and is a high throughput technique which is equivalent to performing 1000 Sanger sequencing reactions at one time. The main features of Next Generation Sequencing are;

- Highly parallel – many sequencing reactions take place at the same time.
- Microscale – reactions are tiny, and many can be done at once on a chip.
- Rapid – since reactions are done in parallel, results are ready much faster.
- Shorter length – reads typically range from 50-500 - 700-7000 nucleotides in length.

Gene sequencing is mainly used to determine the sequence of a novel gene or to analyze mutations of a gene present in diseased states and to confirm the genetic basis of diseases. It is also applied in the field of agricultural biotechnology to determine new varieties of plant species and to identify plant genes responsible for beneficial agronomic traits such as pest resistance, disease resistance, and drought resistance.

## What is DNA Fingerprinting?

DNA fingerprinting is a technique mainly used in forensic studies to confirm the identity of a person involved in a forensic investigation. In early days, DNA fingerprinting was done using a hybridization technique using fluorescent or radio labeled markers. At present, DNA fingerprinting is done using the technique RFLP. This technique uses [restriction enzymes](#), which are enzymes capable of chopping DNA at specific sequences. When two samples are brought for analysis, both samples are digested with the same restriction enzymes to yield fragments. If the two samples are similar, the electrophoresis gel image should be identical for both samples. If it is not similar, the gel images will not be identical. Thus, the identity of a person could be confirmed through this technique.

DNA fingerprinting is most often used in finding the true suspect of a crime scene by analyzing the available biological samples at the crime scene. DNA is extracted from these available samples (hair/semen/spit/blood) and analyzed with the DNA samples of the suspects to determine the true culprit.



Figure 02: DNA Fingerprint

## What are the similarities between Gene Sequencing and DNA Fingerprinting?

- In both cases, the sample analyzed is a DNA sample.
- Electrophoresis is used to determine the results in both techniques.

## What is the difference between Gene Sequencing and DNA Fingerprinting?

<b>Gene Sequencing vs DNA Fingerprinting</b>	
Gene sequencing is the process that determines the nucleotide sequence of a particular gene or the whole genome.	DNA fingerprinting involves a technique where DNA samples of two or more subjects are fragmented and analyzed to determine the identity of a person.
<b>Basis of the Technology</b>	
Sequencing methods such as Sanger sequencing or Next Generation sequencing are used in gene sequencing.	Restriction Fragment Length polymorphism is used to analyze two samples of subjects in DNA fingerprinting.
<b>Applications</b>	
Gene sequencing is mainly used in genetic studies to analyze novel genes, to identify mutations and to develop inferences based on genetic diagnostics.	DNA fingerprinting is used in forensic investigations to derive conclusions about the identity of a suspect.

## Summary – Gene Sequencing vs DNA Fingerprinting

Gene sequencing and DNA fingerprinting have become two popular tests which are performed to characterize a particular gene or to identify a particular person using the person's genetic fingerprint. These techniques are accurate and rapid and are performed by skilled personnel in order to derive confirmed results. The difference between gene sequencing and DNA fingerprinting is that gene sequencing focuses on finding the exact nucleotide order of the gene while DNA fingerprinting focuses on confirmation of the identity of individuals in forensic studies.

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3. "DNA sequencing." Khan Academy, [Available here](#). Accessed 6 Sept. 2017

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