DNAfingerprinting is a chemical test that shows the genetic makeup of a person or other living things. It’s used as evidence in courts, to identify bodies, track down [blood](https://www.webmd.com/heart/anatomy-picture-of-blood) relatives, and to look for cures for disease.

Since it was invented in 1984, DNA fingerprinting most often has been used in court cases and legal matters. It can:

* Physically connect a piece of evidence to a person or rule out someone as a suspect.
* Show who your parents, siblings, and other relatives may be.
* Identify a dead body that’s too old or damaged to be recognizable.

DNA fingerprinting is extremely accurate. Most countries now keep DNA records on file in much the same way police keep copies of actual fingerprints.

It also has medical uses. It can:

* Match tissues of organ donors with those of people who need transplants.
* Identify diseases that are passed down through your family.
* Help find cures for those diseases, called hereditary conditions.
* The procedure for creating a DNA [fingerprint](https://www.britannica.com/topic/fingerprint) consists of first obtaining a sample of [cells](https://www.britannica.com/science/cell-biology), such as skin, hair, or [blood](https://www.britannica.com/science/blood-biochemistry) cells, which contain DNA. The DNA is extracted from the cells and purified. In Jeffreys’s original approach, which was based on [restriction fragment length polymorphism](https://www.britannica.com/science/restriction-fragment-length-polymorphism) (RFLP) technology, the DNA was then cut at specific points along the strand with [proteins](https://www.britannica.com/science/protein) known as [restriction enzymes](https://www.britannica.com/science/restriction-enzyme). The enzymes produced fragments of varying lengths that were sorted by placing them on a gel and then subjecting the gel to an [electric current](https://www.britannica.com/science/electric-current) ([electrophoresis](https://www.britannica.com/science/electrophoresis)): the shorter the fragment, the more quickly it moved toward the positive pole (anode). The sorted double-stranded DNA fragments were then subjected to a blotting technique in which they were split into single strands and transferred to a nylon sheet. The fragments underwent autoradiography in which they were exposed to DNA probes—pieces of [synthetic](https://www.merriam-webster.com/dictionary/synthetic) DNA that were made radioactive and that bound to the minisatellites. A piece of [X-ray](https://www.britannica.com/science/X-ray) film was then exposed to the fragments, and a dark mark was produced at any point where a radioactive probe had become attached. The resultant pattern of marks could then be analyzed.
* The assay developed by Jeffreys has been supplanted by approaches that are based on the use of the [polymerase chain reaction](https://www.britannica.com/science/polymerase-chain-reaction) (PCR) and so-called microsatellites (or short tandem repeats, STRs), which have shorter repeat units (typically 2 to 4 base pairs in length) than minisatellites (10 to more than 100 base pairs in length). PCR amplifies the desired fragment of DNA (e.g., a specific STR) many times over, creating thousands of copies of the fragment. It is an automated procedure that requires only small amounts of DNA as starting material and works even with partially degraded DNA. Once an adequate amount of DNA has been produced with PCR, the exact sequence of nucleotide pairs in a segment of DNA can be determined by using one of several biomolecular sequencing methods. Automated equipment has greatly increased the speed of [DNA sequencing](https://www.britannica.com/science/DNA-sequencing) and has made available many new practical applications, including pinpointing segments of genes that cause [genetic diseases](https://www.britannica.com/science/human-genetic-disease), mapping the [human genome](https://www.britannica.com/science/human-genome), engineering drought-resistant [plants](https://www.britannica.com/plant/plant), and producing biological [drugs](https://www.britannica.com/science/drug-chemical-agent) from genetically altered [bacteria](https://www.britannica.com/science/bacteria).

An early use of DNA fingerprinting was in [legal disputes](https://www.britannica.com/topic/criminal-investigation), notably to help solve crimes and to determine [paternity](https://www.britannica.com/topic/father-kinship). Since its development, DNA fingerprinting has led to the [conviction](https://www.merriam-webster.com/dictionary/conviction) of numerous criminals and to the freeing from prison of many individuals who were wrongly convicted. However, making scientific identification coincide exactly with legal proof is often problematic. Even a single suggestion of the possibility of error is sometimes enough to persuade a jury not to convict a suspect. Sample contamination, faulty preparation procedures, and mistakes in interpretation of results are major sources of error. In addition, RFLP requires large amounts of high-quality DNA, which limits its application in [forensics](https://www.merriam-webster.com/dictionary/forensics). [Forensic](https://www.merriam-webster.com/dictionary/Forensic) DNA samples frequently are degraded or are collected [postmortem](https://www.britannica.com/topic/autopsy), which means that they are lower-quality and subject to producing less-reliable results than samples that are obtained from a living individual. Some of the concerns with DNA fingerprinting,