

## 14–3 Human Molecular Genetics

### Human DNA Analysis

There are roughly 6 billion base pairs in your DNA.

Biologists search the human genome using sequences of DNA bases.

Genetic tests are available for hundreds of disorders.

DNA testing can pinpoint the exact genetic basis of a disorder.

### DNA Fingerprinting

**DNA fingerprinting** analyzes sections of DNA that have little or no known function but vary widely from one individual to another.

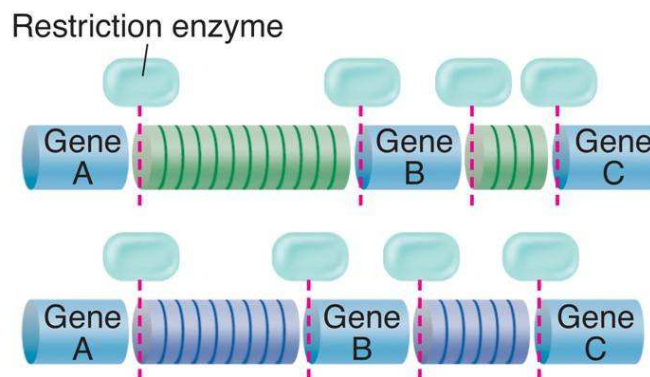
Only identical twins are genetically identical.

DNA samples can be obtained from blood, sperm, and hair strands with tissue at the base.

Chromosomes contain large amounts of DNA called repeats that do not code for proteins.

This DNA pattern varies from person to person.

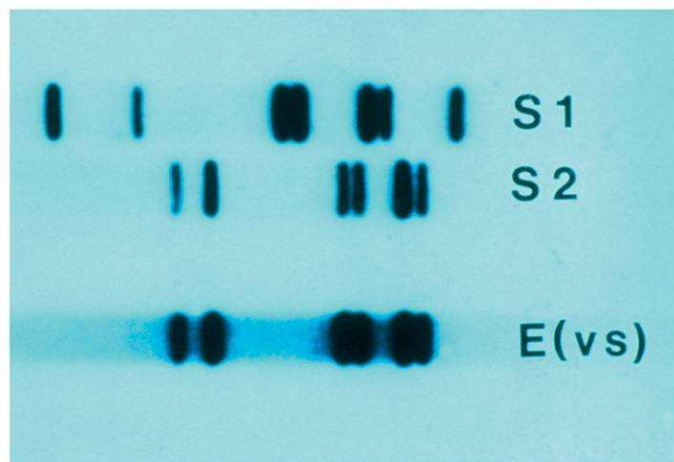
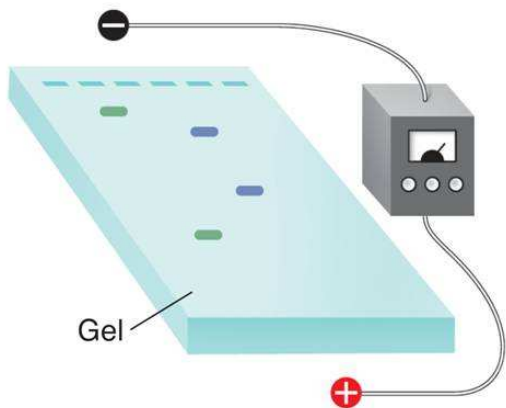
Restriction enzymes are used to cut the DNA into fragments containing genes and repeats.



DNA fragments are separated using gel electrophoresis.

Fragments containing repeats are labeled.

This produces a series of bands—the DNA fingerprint.



### The Human Genome Project

In 1990, scientists in the United States and other countries began the Human Genome Project.

**The Human Genome Project is an ongoing effort to analyze the human DNA sequence.**

In June 2000, a working copy of the human genome was essentially complete.

Research groups are analyzing the DNA sequence, looking for genes that may provide clues to the basic properties of life.

Biotechnology companies are looking for information that may help develop new drugs and treatments for diseases.

- Data from publicly supported research on the human genome have been posted on the Internet on a daily basis.
- You can read and analyze the latest genome data.

### Gene Therapy

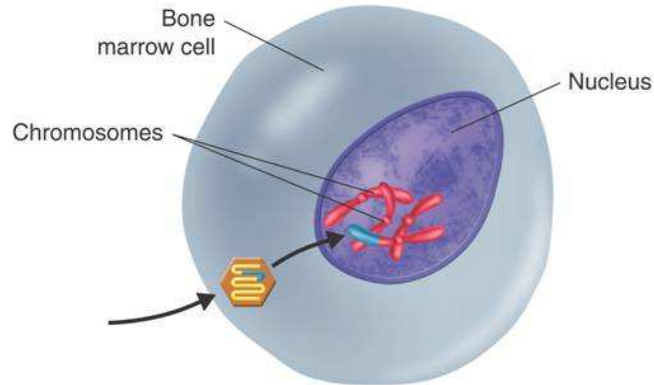
**In gene therapy, an absent or faulty gene is replaced by a normal, working gene.**

The body can then make the correct protein or enzyme, eliminating the cause of the disorder.

Viruses are often used because of their ability to enter a cell's DNA.

Virus particles are modified so that they cannot cause disease.

A DNA fragment containing a replacement gene is spliced to viral DNA.



Genetically engineered virus

The patient is then infected with the modified virus particles, which should carry the gene into cells to correct genetic defects.