

Genes and Genomics



Your **genes** are the instructions for building your body and they tell your body how to work. They determine things like your eye colour, your height or your risk for a health condition.

You have around 20,000 genes. Each of your genes are made up of **DNA**, which contains a four-letter chemical code (**A, T, C** and **G**). Each gene has thousands of letters, and your entire genetic code contains 6 billion letters. It would take 57 years to read out your DNA sequence. Your entire genetic code is called your **genome**. **Genomics** is the study of the genome.



Your genes act as templates for messages, which cells in your body use to make **proteins**. These proteins are the building blocks of your body. Only about 2% of the genetic information you have, is actually used for making proteins.

Most genes come in two copies, one inherited from your mother, the other from your father.



Your genes are arranged along large tightly-packed structures called **chromosomes**. Most of us have 46 chromosomes, in 23 pairs. Each of your chromosomes contains many genes. If unravelled, the chromosomes from just one of your cells, would stretch for 2 metres.

You share 99.9% of your genetic information with other people. It is the other 0.1% that **makes you unique**.

The genetic differences you have can be inherited from your parents or can happen randomly. Generally, these genetic differences are part of normal human variation, and each person's **genome** contains millions of these variants.

However, sometimes genetic variants can disrupt the normal function of genes and cause health problems. For example, through gaining an extra chromosome, or having single letters changed, missing or duplicated in the genetic code. These variants are sometimes called mutations.



Your genes are just one element that contributes to your appearance, your body function, or your risk of developing a condition. Your diet, lifestyle and environment also come into play.

However, as we gain more understanding of genes, we can also better understand the role of genetics and genomics in health and disease, and improve healthcare for you, and all