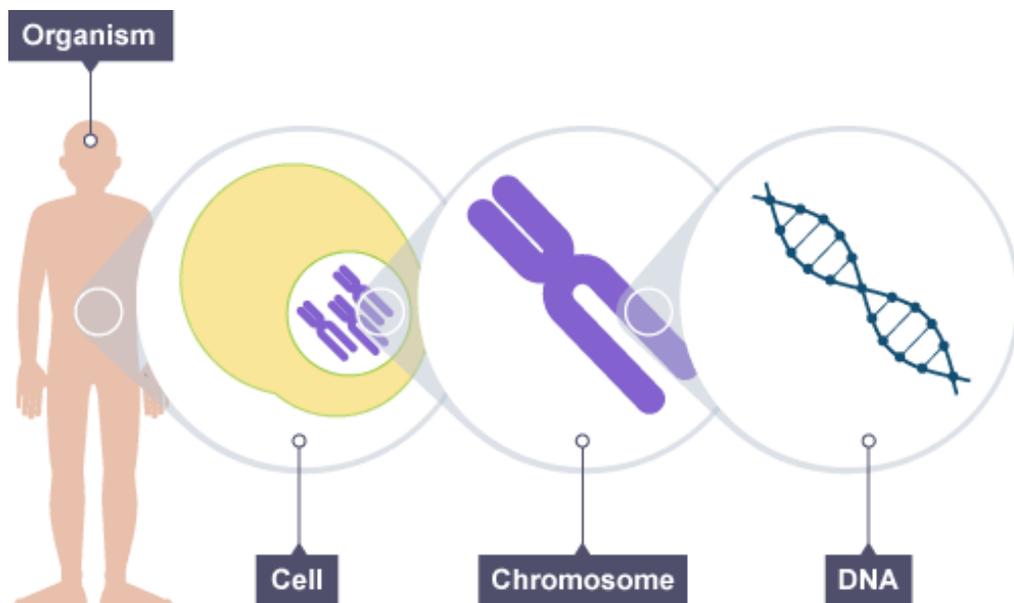


Basics of Genetics

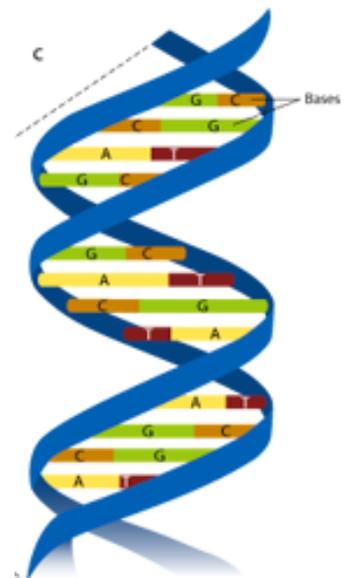
Our body is made up of **cells**, each of which contains the **genetic** information (our **genes**) that we **inherit** from our parents. There are thousands of **genes** in the body. Each gene provides instructions to the body on how to carry out everything it needs to do to survive.

Genes are made up of **DNA**, and are packaged into structures called **chromosomes** within the cell.



DNA itself is composed of four chemical letters (**base pairs**) called **adenine (A)**, **Guanine (G)**, **Thymine (T)**, and **cytosine (C)**. Together, these four base pairs make up our entire **genetic** code, and provide all the instructions to the body. **Genes** are responsible for making **proteins**, and **proteins** perform all the functions of the body.

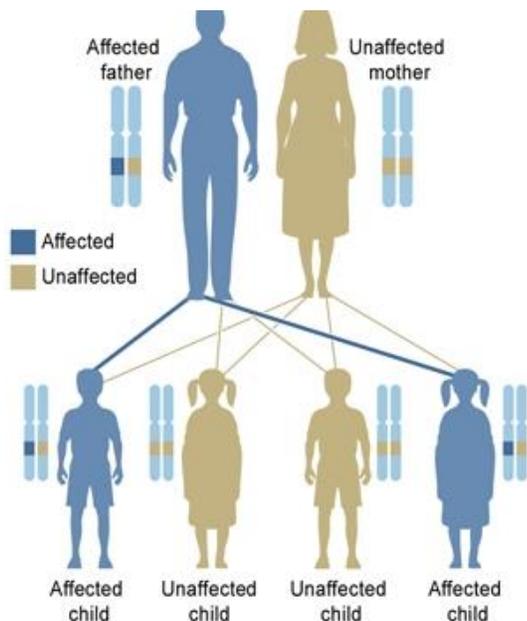
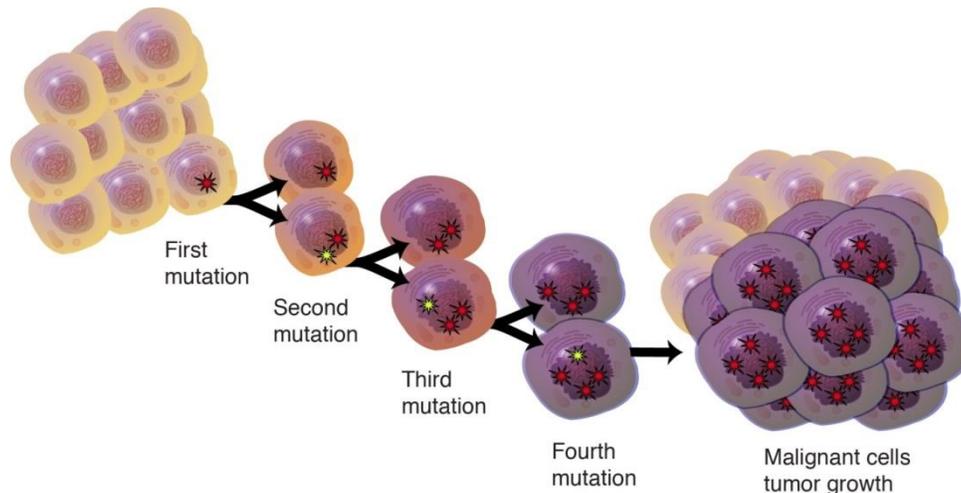
As we grow up and age, the **cells** in our body grow and divide. This process is controlled by certain **genes** in the body. Every time our **cells** divide, all our **genes** are replicated, or copied. Sometimes, mistakes or “typos” are made when our genes are being copied. Luckily the body has a way of going back and fixing these “typos”, similar to spell check. However, sometimes, these typos can be overlooked. Usually,



these “typos” are benign or do not cause problems with how the gene works. At other times, these “typos” can lead to health issues such as cancer. These harmful changes in a gene are called **mutations**. **Mutations** can cause a gene to become defective and stop working correctly.

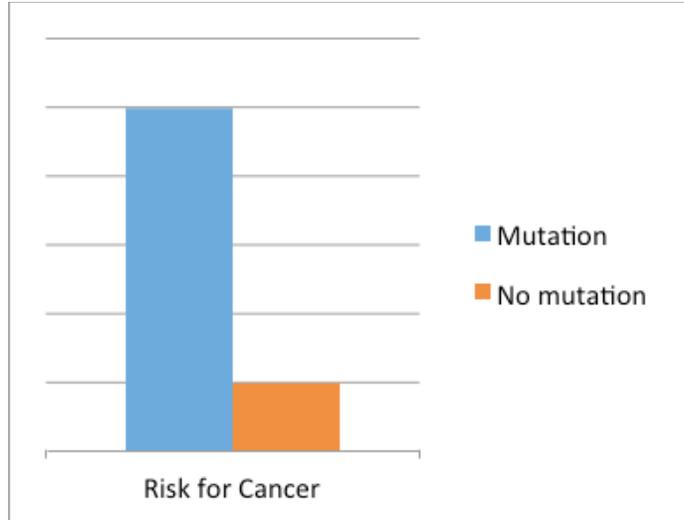
We currently do not know the function of every **gene** in the body. However, we do know that some genes tell the body how to protect itself from cancer. They do this by fixing mistakes in other genes, or by controlling if and when a cell should grow and divide.

If there is a **mutation** in a gene whose job is to fix “typos”, other mistakes down the line may not get corrected. If one cell keeps acquiring a lot of **mutations**, it begins to grow and divide uncontrollably. This process is what leads a single cell to become cancerous.



In some families, these harmful **mutations** are passed down from generation to another, and someone can **inherit** a broken copy of a gene from a parent. In these cases, the mutation is usually present in every **cell** of the body. Family members who inherit this broken gene are born with a **predisposition** to cancer. This means they have a higher risk for developing cancer over the course of their lifetime compared to others. About 5-10% of cancers happen this way. These are called hereditary cancers.

While [inheriting](#) a broken gene increases someone's risk for developing cancer, it does not mean that person will get cancer. Some people inherit a broken gene and have a higher risk for cancer, but never develop cancer. Altered [management](#) and a healthy lifestyle can play a part in this. Similarly, not inheriting a broken gene does not mean that someone will never get cancer. Most people who have cancer have not inherited a broken gene.



The following information, developed by certified genetic counselors at [Harold C. Simmons Comprehensive Cancer Center](#), is intended as a guide to hereditary [breast](#), [colon](#), and other cancers. We encourage you to contact our team for additional information on cancer syndromes, [genetic testing](#), patient care, referrals, and [genetic counseling](#).