Cancer Treatment Centers of America®

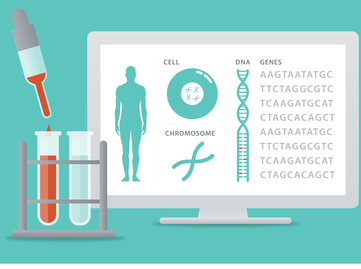
WHAT'S THE DIFFERENCE?

Genetics *vs.* Genomics

Although they sound similar, genetics and genomics are different. Considering the major advancements that have been made in both fields of science, and the relationship each has to cancer, it's important to understand the difference.

GENETICS refers to the study of the DNA makeup a person is born with and the hereditary traits (genes) that are passed from generation to generation.

GENOMICS refers to the study of the DNA makeup of a tumor, and the changes (mutations) that drive its growth and other behaviors.



BOTH INVOLVE THE STUDY OF DNA

The human body is made up of trillions of cells. Each cell contains DNA, which stores genetic information that acts as the body's, or the tumor's, instruction manual. Each strand of DNA has thousands of genes, which tell the cells what to do and when and how to do it.

GENES' RELATIONSHIP TO CANCER

Cancer is a genetic disease caused by mutations, or abnormal changes, in genes that control how cells function, like how they divide, grow and spread.

For example, some mutations:

Cause cells to **divide repeatedly** and **grow out of control**

Prevent cells from **repairing abnormalities,** which then develop into cancer

Enable cancer cells to **evade the immune system**

There are two types of mutations

HEREDITARY	ACQUIRED
Inherited from one or both parents at the time of conception	Occur **after conception**
May **increase the risk** of certain cancers	Can't be passed to offspring
Cause **5-10 percent** of all cancers	Caused by **external factors and lifestyle habits,** such as smoking, diet, toxic chemical exposure, ultraviolet radiation from the sun
EXAMPLE Link between inherited BRCA1 or BRCA2 mutations and breast, ovarian and pancreatic cancers	**EXAMPLE** Link between smoking and lung cancer, or between exposure to UV light and skin cancer

GENETICS

Genetics tell us why a person may have certain traits like:

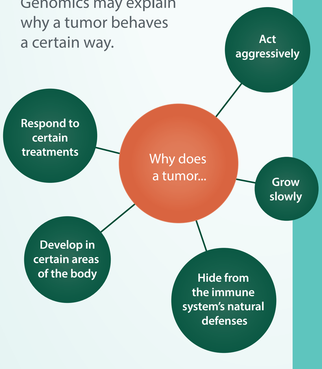
- HAIR AND EYE COLOR
- HAIR TEXTURE
- SKIN TONE
- HEIGHT
- SHOE SIZE
- BIRTH DEFECTS
- HEREDITARY CANCER RISKS

Studying genetics helps inform people of their cancer risks, so they may:

- ☑ Understand how they may have developed a particular cancer
- ☑ Understand their risk of developing a future cancer
- ☑ Take preventive measures such as a prophylactic mastectomy
- ☑ Be alert to possible cancer symptoms
- ☑ Be proactive in undergoing regular screenings
- ☑ Talk to other family members about their health risks

GENOMICS

Genomics may explain why a tumor behaves a certain way.



Studying the genomic makeup of the tumor may help guide the patient's treatment plan by:

Looking for specific mutations that are known to cause tumors to behave a certain way

Matching those mutations to treatments that have been designed to counteract those behaviors

Ruling out immunotherapy, targeted therapy or other precision cancer treatments that are not likely to work, given the lack of known mutations found in the tumor

For more information, visit **cancercenter.com/genomics-vs-genetics**

SOURCES

National Cancer Institute, American Cancer Society, National Institutes of Health

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Comprehensive Cancer Care Network