Genetic Testing
FOR CANCER

Virginia Oncology Associates

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Cancer is a genetic disease—that is, cancer is caused by changes to genes that control the way our cells function, especially how they grow and divide.

We will explain and explore the field of genetics and genetic testing as it applies to cancer, including:

Hereditary vs. Sporadic Cancers
PAGE 3

Gene Mutations
PAGE 4

Cancer Syndromes
PAGE 5

Genetic Testing: Who Should Get It, How It's Conducted, and How to Get Started
PAGE 6

How Common Are Hereditary Cancers?

It may be surprising, but most cancers occur sporadically and are not passed down through the family

Sporadic Cancers

90-95%

Nearly all cancers occur by chance. The causes for sporadic cancers are mostly unknown. Environmental and lifestyle risk factors (e.g. smoking, UV exposure) as well as aging may play a part.

With sporadic cancers, there may be very few individuals in a family affected, there is no clear pattern of inheritance, and the age at diagnosis is usually >50.

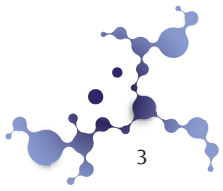
Hereditary Cancers

5-10%

Only about 5-10% of cancers are considered to be hereditary. This means there is a gene change passed down through the family. These gene changes can be passed down through the mother or father.

Familial Cancer

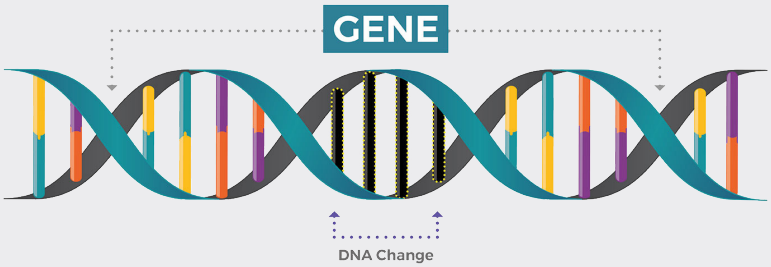
Cancer is classified as familial when there appears to be more cancer in a family than what would occur by chance alone, but the cause has not been identified. Multiple genetic and/or enviromental factors could increase the risk for cancer in the family.



What is a gene mutation?

Each of us has a set of genes passed down to us from our parents. They are made up of DNA and determine many things that make us individuals from how our cells divide to the color of our hair and eyes.

A gene mutation is a permanent change in the DNA sequence that makes up a gene.



Mutations range in size, with some affecting a single DNA building block, to others affecting a large segment of a chromosome that contains multiple genes.

Hereditary vs Acquired Gene Mutations

Changes in our genes may be passed down from one generation to the next. They can also be caused by influences within the environment, or in some cases they just happen sporadically.

Hereditary mutations are inherited from a parent (mother or father) and are present throughout a person's life in virtually every cell in the body.

Acquired mutations occur at some time during a person's life and are present only in certain cells, not in every cell in the body.

Gene mutations can result in various conditions, not just cancer. However, the presence of a gene mutation does not mean you will definitely develop a particular disease or condition.

What is a cancer syndrome?

A cancer syndrome is a genetic condition in which inherited genetic mutations result in higher-than-normal risk for certain types of cancer within a family.

In some cases, cancer might occur because family members share certain behaviors or exposures that increase cancer risk (like smoking or obesity).

In other cases, the cancer is caused by an abnormal gene that is being passed along from generation to generation.

Things that may indicate that the cancer is hereditary can include:

- More than one type of cancer in a single person, such as a woman who has both breast and ovarian cancer
- Multiple cases of the same type of cancer, especially cancers that are uncommon or rare
- More than one childhood cancer in siblings like a brother and sister both affected by sarcoma
- Cancers that occur at younger ages than usual, such as breast or colon cancer <50
- Rare cancers like male breast cancer
- Cancers that occur in both pairs of organs like the eyes, kidneys, breasts, etc.
- Cancer that spans multiple generations, such as in a grandfather, father, and son

Because some cancer syndromes are caused by an inherited gene, there may be testing that can be done to determine whether the cancer is sporadic or due to a hereditary gene mutation.

Who should get genetic testing for cancer?

People who are concerned about whether their family history puts them at risk for cancer should talk with a genetic counselor. They will be able to look at your medical history and your family's to see if genetic testing is recommended.

Those who are most likely to qualify for genetic testing have a personal or family history (first or second-degree relative) with the following:

- A genetic mutation known to cause cancer, such as BRACA1 or BRACA2
- Cancer that was diagnosed at an unusually young age (under age 50)
- Cancer in both organs of a set of paired organs, such as both kidneys or both breasts
- Ovarian cancer at any age
- Several different types of cancer that have occurred independently in the same person
- Multiple relatives (3 or more) with breast cancer, ovarian cancer, pancreatic cancer and/or aggressive prostate cancer
- More than 20 polyps in the colon
- Ethnic predisposition, specifically Ashkenazi Jewish ancestry
- Unusual cases of a specific cancer type like breast cancer in a man

If you or a family member on either side of your family has had any of the above mentioned, please take our online questionnaire and consult with the VOA Genetic Counselors.

Remember, this is a personal decision that could impact future decisions that you or your family members make. You may want to ask your family members for their preference regarding knowing your results before you share them. Some people may be eager to hear the results while others ask you not to disclose information to them. It's important to respect each family member's decision and know that over time those who were not ready for the information may change their minds.

How we conduct genetic testing

Genetic testing is often done as part of a genetic consultation. It may be in the same session as your initial consultation or it can be done later.

Genetic tests for cancer are done using a blood or saliva sample. The sample is sent to a lab for testing. Results return in a few weeks and are reviewed with you by a genetic counselor or other healthcare provider.

What your genetic counselor will go over:

Before Testing:

Genetic counselors cover many aspects of genetic testing including the process itself as well as what your test results mean. e.g., medical and family history, psychosocial aspects of testing, cost, etc.

After Testing:

Genetic counselors can interpret your test results, including any mutations that may have been detected. They can also talk with you about the implications these results might have for you and your family.

Genetic counselors may also provide recommendations for preventive care and screening, refer you to support groups and other information resources, and provide you with emotional support.

Genetic counselors will also talk with you about who has legal access to the results of your test, such as your employer or insurance company. This includes discussing the Genetic Information Nondiscrimination Act (GINA), which became federal law for all U.S. residents in 2008.

GINA prohibits discrimination based on genetic information in determining health insurance eligibility or rates and suitability for employment. It does not, however, cover members of the military, and it does not apply to life insurance, disability insurance, or long-term care insurance.

How to get started with genetic counseling:

If you believe genetic testing is right for you and your family, and you are located in Hampton Roads or Northeastern North Carolina, take our online questionnaire and consult with the VOA Genetic Counselors.

If you had a test done more than five years ago, then you may want to get another test, as updates in genetic testing may be available.

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Visit our website for helpful information like the following:

- What types of cancer can be determined by genetic testing?
- Advantages and disadvantages of genetic testing