Cancer Testing

The words “genomics” and “genetics” are often used interchangeably but actually mean different things. It’s important to know that there are two types of genetic testing. These two types of testing include inherited risk (genetic) and tumor profiling (genomic) testing.

Genomics and Genetics

Genomics is the study of the entire genome—or the complete set of the DNA in any living cell. This is different from genetics, which refers to the study of single genes and their effects. Even though these are technical terms with standard definitions, in general, genomics is used to assess the genes that make up the cancer.

Genomic Tumor Assessment versus Genetic Cancer Syndromes

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This article provided by Cancer Treatment Centers of America
Genetics applies to checking the genes that we have inherited from our parents. Genomics is cancer-specific, whereas genetics is patient-specific.

**Genomic testing**
Just as every person or every fingerprint is different—every cancer is different. Two patients who have identical cancer diagnoses may have tumors that look entirely different at the molecular level. Each cancer or tumor has its own genetic expression. Understanding these genetic changes is helping us to understand how cancer develops and is best treated.

This is where genomic tumor assessment comes in. Genomics reveals the DNA alterations that are driving the growth of a cancer. As we understand more about gene mutations, we are better able to provide cancer treatment therapies that specifically target changes in the tumor’s genomic profile.

Identifying the individual “fingerprint” of a patient’s cancer, means that treatment options can be more precise. This new approach to cancer treatment—marked by specific, targeted and customized therapies—can offer patients invaluable, additional options.

At Cancer Treatment Centers of America, our clinicians have been using genomic tumor testing for several years as part of the standard care for patients with breast cancer and non-small cell lung cancer. Recent breakthroughs at research hospitals have revealed the value of a broader application of genomic tumor assessment. Genomic testing examines a tumor on a genetic level to find the DNA alterations that are driving the growth of cancer. By identifying the mutations that occur in a cancer cell’s genome, our physicians can better understand what caused the tumor and tailor treatment based on these findings.

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**How genomics is used in cancer treatment**
Genomic analysis allows us to take a cancer diagnosis to a new level. Traditionally, cancer was simply staged: how big is it and where is it in the body? Now we’re moving from staging cancer to identifying molecular subtypes—and we’re finding that different treatments actually do seem appropriate for different cancers.

A benefit of genomic medicine for patients is that it can provide a more accurate diagnosis of the cancer, which can then guide treatment decisions. Patients with a favorable prognosis may be able to avoid unnecessary treatments, such as chemotherapy. Patients with an unfavorable prognosis may be offered more aggressive treatment. Another advantage is that if doctors can identify specific genetic alterations in a tumor, they can often use more specific, targeted treatments to treat the cancer.
What happens during a genomic test?

During a genomic test:

Cancer tissue (if available) or a biopsy of the tumor will be collected for evaluation.

Refined laboratory methods will capture genomic information in the tumor cells.

Scientists at the sequencing lab extract the DNA from the tissue or tumor sample.

Genetic information is then encoded as a sequence of nucleotides, which form the building blocks of DNA. Scientists at the lab then sequence the genes in the tissue or tumor sample to uncover the order of nucleotides.

Sequencing the tumor’s genetic profile produces a large amount of data. Scientists at the lab analyze this data to identify mutations that are critical to certain functions of the tumor.

An oncologist will then review the test results to determine if the information is helpful in the selection of a good treatment option.

Genomic medicine can offer a more precise approach by tailoring treatment to a patient’s genetic information, specifically how the patient’s genes function normally or trigger disease. But not all gene mutations can be matched with an existing treatment. Additionally, the results help physicians identify personalized treatment options, rather than using the data solely for research purposes or to create a database of tumor types.

"Genomic analysis allows us to take a cancer diagnosis to a new level."
Whether or not genomic testing is right for you is a decision you now have the opportunity to make with your medical team based on your individual situation.

**Genetic testing for inherited cancer risk**

Genetic testing is another area that can be confusing to understand, but having this knowledge can be very powerful. Genetic testing has become a hot topic since several public figures shared their decision to have a double mastectomy after testing positive for the BRCA gene mutation. For people who have family members with cancer, this can help answer the question, “Was I born with a risk of developing cancer and can I pass it on to my children?”

The more well-known forms of inherited risk testing are BRCA 1 & 2 which tests for breast and ovarian cancer risk, and Lynch Syndrome which tests for colon cancer risk. These are blood tests, or also called buccal swabs, which are sent to a lab for genetic testing.

Recent clinical developments in BRCA testing indicate a link between prostate/pancreatic cancer, breast cancer and ovarian cancer. Traditionally, the medical community believed that the risk for breast or ovarian cancer lies solely on the mother’s side.

However, recent information has shown that men with prostate or pancreatic cancer that have two or more family members with certain types of cancer could test positive for BRCA mutations. This means a man could potentially pass this genetic risk along to his daughters, thereby increasing their risk of developing breast or ovarian cancer. This is an important addition to genetic testing guidelines because it empowers family members to take preventative measures.

If individuals do test positive and have a high risk of cancer, they have the time to act. These actions can vary and include lifestyle changes, such as stopping smoking, increasing physical activity, and improving nutrition. There are also drugs available that can reduce the risk for some cancers, such as Tamoxifen for breast cancer. Some patients at a very high risk choose preventive surgeries, such as a mastectomy or removal of the ovaries.

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