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Cancer Genetics

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Most cancer is random, or sporadic, and not due to hereditary causes. However, cancer can be hereditary in some families. Many factors can increase the likelihood that the cancers in a family are hereditary. Some of these factors are: early onset of cancer, more than one primary (new) cancer in an individual, the same cancer in two or more close relatives, unusual presentation of cancer (e.g. breast cancer in a male), triple negative breast cancer, and related cancers (such as breast/ovarian/pancreatic cancer or colon/uterine/ovarian cancer) found in the same family. Additionally, certain types of tumors or polyps may have a hereditary component. Individuals of Ashkenazi Jewish ancestry are also at greater risk for hereditary breast and ovarian cancer.

The genetic instructions for our bodies are stored in our cells in genes. Genes are made of our basic genetic code called DNA. Harmful changes (known as mutations) in the DNA have been discovered which can predispose individuals to hereditary cancer.

Genetic testing is often performed on blood or saliva for a single gene or a larger group of genes (panel genetic testing) that are associated with a hereditary cancer syndrome. There are usually three types of genetic test results:

Positive: A positive result means a mutation was identified in a hereditary cancer gene that increases the risk to develop certain cancers or tumors. Typically, specific cancer screening or risk reduction options are available for those individuals who test positive. Family members are also at risk to carry the same mutation and may wish to consider genetic counseling and testing.

Negative: A negative result means a mutation related to a hereditary cancer syndrome was not identified. Cancer screening and risk reduction recommendations are based on one's personal and family history of cancer. Depending on the cancer history in the family, other individuals may benefit from genetic counseling.

Inconclusive (variant of uncertain significance or VUS): A VUS result means a change was identified in a gene but it is unknown if this change is a true mutation (associated with an increased risk of certain cancers), or a benign variation (not associated with an increased risk of cancer). The laboratory will contact the ordering provider if they reclassify the variant. Most variants are reclassified as benign (or normal). Cancer screening and risk reduction recommendations are typically based on an individual's personal and family history of cancer. We typically do not recommend genetic testing for a VUS for unaffected family members. However, based on the family history of cancer, genetic counseling may be recommended for other family members.

Some genes on the panels have not been studied as long or as well as others. Information about the cancer risks and screening recommendations associated with having a mutation in one of these more moderate or uncertain cancer risk genes will likely change over time.