

Hereditary Ovarian Cancer

Most people develop ovarian cancer by chance or as a result of risk factors that occur over the course of a lifetime. However, approximately 15% to 25% of people who are diagnosed with ovarian cancer develop it due to a hereditary ovarian cancer syndrome.

A hereditary ovarian cancer syndrome is an inherited risk to develop ovarian cancer and possibly other cancers. Inherited conditions are passed to an individual through their blood relatives. People who have a hereditary ovarian cancer gene mutation have a higher than average risk of developing ovarian and possibly other cancers.

What Causes Hereditary Ovarian Cancer?

Hereditary ovarian cancer syndromes are caused by an inherited change, called a mutation, in a gene. Genes are the set of instructions that tell all of the cells in our bodies what to do. Genes determine physical characteristics, such as our hair and eye color, the shape of our nose and our blood type. A mutation is a change in a gene that causes it to stop working. In the case of hereditary ovarian cancer, a gene that normally helps to prevent ovarian cancer and possibly some other cancers has stopped working. Therefore, these types of cancer are more likely to develop particularly at a younger age than usual.

The majority of hereditary ovarian cancer is due to the *BRCA1* and *BRCA2* genes. A person who has a *BRCA1* or *BRCA2* mutation has “Hereditary Breast and Ovarian Cancer” syndrome and is at an increased risk for breast, ovarian, prostate, male breast, pancreatic, skin (melanoma) and other cancers. There are also a number of other genes associated with hereditary ovarian cancer. For instance, individuals with Lynch syndrome have significantly increased lifetime risks for colon, uterine, ovarian, stomach and other cancers. There are five different genes that can cause Lynch syndrome: *MLH1*, *MSH2*, *MSH6*, *PMS2* and *EPCAM*. Other genes, such as *RAD51C*, *RAD51D* and *BRIP1*, have also been shown to increase the lifetime risk for ovarian cancer. There are also a number of other genes associated with hereditary ovarian cancer that are not well studied so that the level of increased risk is not yet known.

How is Hereditary Ovarian Cancer Passed on Through a Family?

Each person inherits two copies of most genes. We receive one copy from our mother and one copy from our father. Inheriting a mutation in just one copy of a hereditary ovarian cancer syndrome gene is enough to increase the risks for ovarian and possibly also other types of cancer. There is a 50% chance that a person with a hereditary ovarian cancer syndrome gene mutation will pass it to each of his or her children. However, if a person does not inherit the hereditary ovarian cancer syndrome gene mutation, that person usually has an average chance of developing ovarian cancer.

Why is it Important to Diagnose Hereditary Ovarian Cancer in a Family?

People who have a hereditary ovarian cancer syndrome have a greater than average chance to develop ovarian and possibly other types of cancers. For someone who already has been diagnosed with ovarian cancer, the diagnosis of a hereditary ovarian cancer syndrome may indicate a greater chance of developing another cancer and may also impact cancer treatment.

Because a hereditary ovarian cancer syndrome is inherited, the diagnosis also affects family members. If genetic testing identifies a mutation in a gene that causes a hereditary ovarian cancer syndrome, family members can be tested for that same gene mutation.

It is very important for people with a hereditary ovarian cancer syndrome to consider specialized cancer screening exams. Cancer screening exams are medical tests performed to help identify cancers at their earliest, most treatable stages. They may also consider medical options that can lower their risk of developing cancer. Usually a team of specialists will tailor a cancer screening and risk reduction plan to each patient and his or her family members.

How is Hereditary Ovarian Cancer Diagnosed?

A genetics evaluation includes a review of a person's medical and family history. A multi-generation family tree, called a pedigree, is often drawn during the evaluation. This information is used to determine the likelihood that the person has a hereditary ovarian cancer syndrome. A genetic counselor usually conducts this evaluation.

Some signs in a family history that suggest hereditary ovarian cancer may include:

- Several close blood relatives with ovarian, breast, colon or other related cancers on the same side of the family.
- Relatively early ages at the time of cancer diagnoses.
- More than one primary cancer in one person, such as ovarian and breast cancer.
- Ashkenazi Jewish ancestry.

If you or your family members have any of the above, you may consider the option of genetic counseling and testing. It is important to note that any woman who has been diagnosed with an invasive ovarian, primary peritoneal or fallopian tube cancer should consider the option of genetic evaluation and testing. We encourage you to discuss this with your physicians.

Genetic Testing

A person's blood or saliva sample can be tested for a genetic mutation that causes hereditary ovarian cancer. This testing may be limited to the *BRCA1* and *BRCA2* genes or may also include other genes that cause hereditary ovarian cancer. In general, there are three types of results:

- Positive for a mutation. If a mutation is found, then the diagnosis of a hereditary ovarian cancer syndrome is confirmed. Next, other family members may have a genetic test to learn whether or not they carry the same mutation and have the same hereditary ovarian cancer syndrome.
- Negative for a mutation. If no mutation is found the cancer in the family may not be hereditary. However, a negative genetic test result does not eliminate the possibility of a hereditary ovarian cancer syndrome in the family. This is because current genetic testing technology is not able to identify all mutations that cause hereditary ovarian cancer. It is also possible that the ovarian cancer in the family is being caused by a gene that was not included in the test.
- Variant of unknown significance. A variant is a gene change that does not provide clear information regarding cancer risks. More research is needed to determine whether a genetic variant increases cancer risks. Thus, a variant result should not be used to make medical decisions.

If you are concerned about the possibility of a hereditary cancer syndrome in your family, you are encouraged to discuss your personal and/or family history with your health care provider. Your physician may refer you to the Cancer Genetics Program of the MD Anderson Cancer at Cooper for genetic evaluation and discussion of your genetic testing options. If genetic testing is recommended and you choose to proceed, a blood or saliva sample will be taken during your visit. Please note that health insurance companies may cover most, if not all, of the cost of genetic testing on a case-by-case basis.

Additional Information and Resources

Gilda's Club South Jersey (GCSJ) is a cancer support community in southern New Jersey offering a free, comprehensive program of psychosocial support including educational lectures, workshops, social activities and support groups to men, women, teens and children impacted by cancer. Visit www.gildasclubsouthjersey.org.

F.O.R.C.E. (Facing Our Risk of Cancer Empowered) is a nonprofit organization for women who are at high risk of developing breast and/or ovarian cancer due to their family history and genetic status and for members of families in which a *BRCA* mutation may be present. Check out the "Resource Guide," "Message Board" and "Chat" sections. Visit www.facingourrisk.org.

Be Bright Pink is a national non-profit organization that provides education and support to young women who are at high risk for breast and ovarian cancer. Visit www.bebrightpink.com.

The National Ovarian Cancer Coalition's (NOCC) mission is to raise awareness and to promote education about ovarian cancer. The coalition strives to improve the quality of life for ovarian cancer survivors. The site includes sections on detection, treatment, coping, surviving and more. Visit www.ovarian.org.

Cancer Net offers oncologist-approved cancer information from the American Society of Clinical Oncology. Visit www.cancer.net.

The National Cancer Institute has valuable cancer related health information on more than 200 cancer types, clinical trials, cancer statistics, prevention, screening, risk factors, genetics and support resources. Information is available in Spanish. Visit www.cancer.gov.

American Cancer Society (ACS) is a voluntary national health organization that supports research, provides information about cancer and offers many programs and services to patients and their families. Information is available in Spanish. Visit www.cancer.org.

Genetic Alliance, Inc. supports individuals with genetic conditions and their families, educates the public and advocates for consumer-informed public policies. This site provides information on genetic policy, research and a helpline for people with genetic questions. Visit www.geneticalliance.org.