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My46 Trait Profile

Hereditary Breast and Ovarian Cancer syndrome

Hereditary Breast and Ovarian Cancer is a cancer syndrome where individuals have an increased chance of developing breast cancer, ovarian cancer, and other types cancers. It is caused by mutations in the BRCA1 and BRCA2 genes that make the breast cancer type 1 and type 2 susceptibility proteins.

Characteristics of Hereditary Breast and Ovarian Cancer syndrome

Most cancer occurs as a result of normal aging, lifestyle, and exposures. However, approximately 5% of breast cancer and 10-15% of ovarian cancer is caused by an inherited risk factor (genetic change or mutation) that increases the chances of developing breast, ovarian, and some other cancers. The characteristics of hereditary breast and ovarian cancer (HBOC) can include early-onset cancer, multiple family members with breast and/or ovarian cancer, individuals with more than one separate cancer (e.g. two breast cancers or breast and ovarian cancer), and rare cancers (such as male breast cancer or fallopian tube cancer). The chance of developing breast cancer for women with HBOC can be as high as 80% over their lifetime. The chance of developing ovarian cancer is approximately 40% for women with a BRCA1 mutation and 20% for women with a BRCA2 mutation. Some other cancers are also seen at an increased rate in people with a BRCA1 or BRCA2 mutation, including male breast cancer, prostate cancer, pancreatic cancer, and melanoma.

Diagnosis/Testing

Most cases of HBOC are caused by a mutation in the BRCA1 or BRCA2 genes. These genes are considered tumor suppressor genes because they help the body to repair the normal damage that happens to cells over time and prevent cells from growing uncontrollably. When a person has inherited a mutation in one of these genes, the ability to prevent cancer is impaired. Besides the BRCA1 and BRCA2 genes, mutations in some other genes have been linked to increased breast and/or ovarian cancer risk. Testing of these genes can be considered in families that appear to have HBOC, but have no mutation in BRCA1 or BRCA2 has been found.

Some populations have an increased rate of HBOC, most notably the Eastern European Jewish (Ashkenazi) population, where there are three ancient founder mutations that are found in about 2.5% of individuals of that background today.

Management/Surveillance

With appropriate management and surveillance, cancers can be prevented or detected at earlier stages, when there is a greater chance for successful treatment. For women with HBOC, intensive breast cancer surveillance usually starts at age 25 and ovarian cancer surveillance usually starts at 30. Medications such as birth control pills and tamoxifen can be used to reduce cancer risk. Finally, there is the option of risk-reducing surgeries such as mastectomies (removal of the breast tissue) and salpingo-oophorectomies (removal of the fallopian tubes and ovaries) that greatly reduce the risk of cancer. Risk-reducing salpingo-oophorectomies (RRSO) are currently recommended for women who have completed childbearing or do not wish to have children and are over age 35. This procedure not only decreases ovarian cancer risk, but also breast cancer risk. Hormone therapy is considered safe in women who have not had breast cancer and have early RRSO.

Mode of inheritance

HBOC is inherited in an autosomal dominant pattern. This means inheriting one BRCA1 or BRCA2 mutation is enough for an individual to be at increased risk of developing HBOC-related cancers. The mutation is always inherited from a parent.

Risk to family members

Each child or sibling of an individual with HBOC has a 50% chance of inheriting the BRCA1 or BRAC2 mutation. The mutation is always inherited from a parent. Sometimes, it is clear from the family history of cancer whether a mutation was inherited from the father or mother. When it is not clear, genetic testing can help identify the origin of the mutation, so extended family members can be informed.

When both parents have a BRCA2 mutation, it is possible for their children to inherit two copies of the BRCA2 gene with mutations. This causes a condition called fanconi anemia, which is associated with bone marrow failure, increased cancer risk, and, in some cases, differences in physical and intellectual development.

Special considerations

The risk of cancer is much lower in men than in women who have BRCA1 or BRCA2 mutations. However, it is important to remember that this condition can be inherited from either the mother or the father, and it can be passed to both daughters and sons. Sometimes, there will be less cancer in the family history, if there are many men and few women in the family.

Resources

Facing Our Risk of Cancer Empowered (FORCE)
http://www.facingourrisk.org
Be Bright Pink
http://www.brightpink.org

References

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Created: 04/2013 **Created by:** Julie Mak, MS, MSc, LCGC
Updated: mm/yyyy **Edited by:** Seema Jamal, MSc, LCGC