

IUCC Pink Article- 2/24/07
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Genetic Testing for Breast and Ovarian Cancer

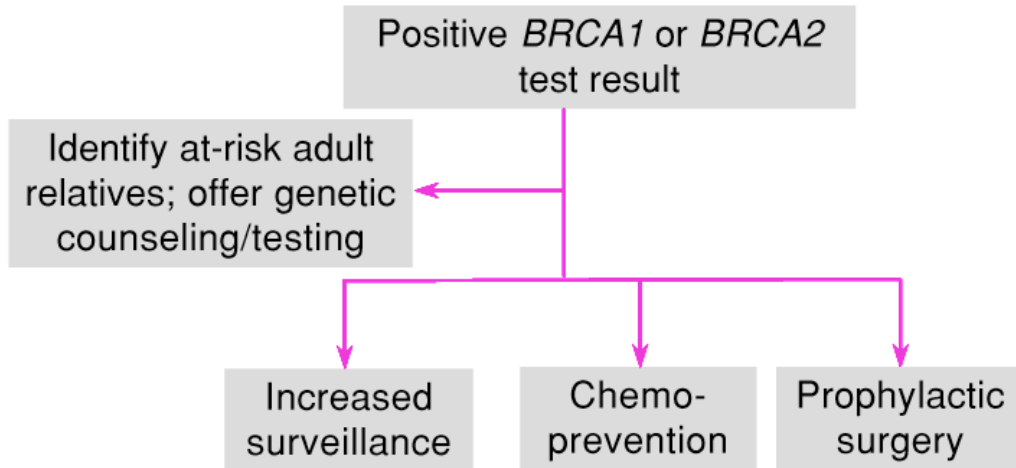
In the Winter 2006/2007 edition of IUCC Pink, there was a short Breast Cancer Quiz with true and false answers. One question asked: "One in nine women will develop breast cancer in their lifetime." The answer is true. Another question asked: "Most women who develop breast cancer have a family history of breast cancer." The answer is false. However, for a small percentage of the women, the risk for breast cancer is higher than one in nine, and they do have a family history of breast and/or ovarian cancer. These women are predisposed to breast and ovarian cancer because of the inheritance of a gene mutation in BRCA1 (breast cancer 1) or BRCA2 (breast cancer 2). These individuals have hereditary cancer in contrast to most of the cases of breast cancer which are considered sporadic or acquired and not due to the inheritance of an identifiable gene mutation.

A gene mutation means the gene has been changed or altered. An abnormal gene makes a defective protein or no protein at all. A protein can be considered the cell's laborer, since the protein performs the task of cellular growth, maturation or normal cell death. A defective or absent protein means the cell function goes awry. Women who inherit a mutation of BRCA1 or BRCA2 have an increased risk of breast and ovarian cancer compared to women who don't have a mutation of either gene. The lifetime risk for breast cancer for women with a mutation of BRCA1 or BRCA2 is approximately 50-85%. In these same women, their risk for ovarian cancer is elevated from the general population's risk of 1.5% to a lifetime risk of between 20 and 40%.

A gene mutation of BRCA 1 or BRCA2 can be inherited from either the mother or father. Often, depending on family size, there will be multiple relatives with breast or ovarian cancer. However, in some families, the family size is small and there are few women, such that the family history doesn't have multiple members with breast or ovarian cancer. Other characteristics of inheritance of a mutation of BRCA 1 or 2 include:

- 1) women with early onset breast cancer, before age 50
- 2) males with breast cancer
- 3) women with bilateral breast cancer or two primary breast cancers
- 4) ovarian cancer
- 5) breast and ovarian cancer in a woman;
- 5) close family members (mother, sister, aunt, grandmother) with breast or ovarian cancer
- 6) other associated cancers such as pancreatic cancer or melanoma

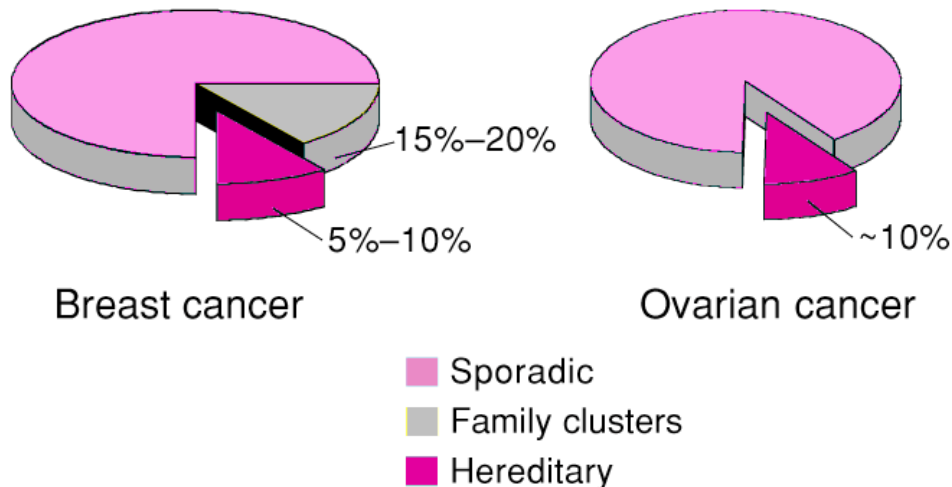
Clinical Management of *BRCA1* and *BRCA2* Mutation-Positive Patients



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How Much Breast and Ovarian Cancer Is Hereditary?



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Genetic testing is available at Indiana University Cancer Center to determine if a mutation of BRCA 1 or BRCA2 is present. Testing is performed in conjunction with genetic counseling so the individual is fully informed about the risks and benefits of the test and what the test will and won't answer. For example, a positive test result, in a healthy person, provides information on the *risk* of developing breast and ovarian cancer. However, not all women who inherit an altered gene will develop breast or ovarian cancer. The test will not determine who will or won't develop cancer.

The Indiana Familial Cancer Program, of the Indiana University School of Medicine, provides genetic counseling and genetic testing for family members with hereditary cancer. The clinic is staffed by genetic counselors and medical geneticists with specialized training in cancer genetics. During a clinic visit the medical and family history is documented and a pedigree or family tree is constructed. Other discussions that occur during a clinic visit include:

- how cancer is inherited
- how the family history of cancer affects the risk for developing cancer
- whether or not the cancer identified in the family is likely to be inherited
- a risk estimate for family members who have not developed cancer or for a secondary cancer in those persons with cancer
- recommendations for medical screening or other management options
- genetic testing, if appropriate

If genetic testing is performed, a peripheral blood specimen is drawn and sent to a clinical laboratory. It takes approximately one month to receive test results. Once results are available, an appointment is scheduled to provide the test result and discuss the implication of the result. There are three possible test results: positive, negative please add back the deleted phrase unless you think it is too confusing, and a variant of unknown clinical significance. When a test result is negative, it can be a true or false negative. A true negative result is seen if there is already a known mutation in the family. A false negative occurs when our current technology is not able to detect a mutation that is known to cause cancer. The possibility and consequences of each is discussed in the pre-testing session.

Patients are referred to the clinic by their family doctor, gynecologist, oncologist, surgeon or by self-referral. To learn more about the Indiana Familial Cancer Program please visit the website at: <http://www.familialcancer.iupui.edu/>