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The Complexities of Genetic Testing

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It has been just over 10 years since the discoveries of BRCA1 and BRCA2. Looking back on this decade of research, we have made clear advances in elucidating the genetics of breast cancer. However, instead of simplifying our understanding of breast cancer, this additional knowledge has added new levels of complexity.

A genetic (familial) component may account for approximately 5 percent of all breast cancers, and of that 5 percent, BRCA1 and BRCA2 probably account for no more than 70 to 80 percent, and possibly much lower. Recent data show that other genes are important in the development of cancer, but these genes are not as easily traceable to breast cancer.

BRCA1 and BRCA2 are “susceptibility genes” that confer a greater lifetime risk of developing cancer. It’s important to understand that BRCA1 and BRCA2 confer a susceptibility to cancer and do not directly cause cancer, so not every person who carries the gene will definitively develop cancer. Specifically, a mutation in these genes impairs the ability of a normal cell to fix damage to its DNA that under normal circumstances will accumulate over time. Some of these DNA mutations may lead to cancer. Women with BRCA1 or BRCA2 mutations have a 50 to 85 percent lifetime risk of developing breast cancer as well as an increased lifetime risk of ovarian cancer. Male BRCA2 carriers have a 6 to 7 percent risk of developing breast cancer over their lifetime.

The difficulty faced by patients stems from trying to put all of these figures together. Since researchers have only identified two of the many genes that may potentially cause breast cancer, a negative BRCA1/BRCA2 test doesn’t mean a person has no genetic risk of developing the disease. Similarly, a positive test doesn’t mean a woman will develop breast or ovarian cancer.

Beyond interpreting results of a test, the implications may have a profound effect on future decisions for the patient and family. Before having the test, a woman should talk to a genetic counselor and decide if knowing her genetic susceptibility will provide her or her family with information that can aid in making a decision about preventive measures. A woman should consider genetic testing if she was under 45 when diagnosed, has multiple family members with breast cancer on the same side of the family, has ovarian or male breast cancer in the family or is of Eastern European Jewish descent (Ashkenazi Jews).

The cost of these tests combined with genetic counseling can exceed \$3,000, and the degree of coverage varies among insurers. BRCA1/BRCA2 testing has an important role in understanding and treating breast cancer, but the test and its resultant implications warrant careful guidance from a trained genetics team. The [N](#)

[National Cancer Institute](#) provides an online directory of cancer genetics professionals.