

From Under the Microscope

Angelina Jolie recently made the news for her announcement to have her ovaries and fallopian tubes removed. This announcement arrived approximately two years after she wrote an editorial explaining why she had both of her breast removed prophylactically. The reason behind these decisions is because she carries a mutation in the BRCA1 gene.

Breast cancer is a common disease, affecting about 13%, or 1 in 8 women in the United States. Ovarian cancer is less common, affecting about 1-2%, or 1 in 70 women in this country. Most women with breast or ovarian cancer have a sporadic rather than an inherited cancer. That means the cancer happened randomly. However, some women develop breast and ovarian cancer due to an inherited case. The majority of women with inherited breast and/or ovarian cancers carry a mutation in one of two susceptibility genes, breast cancer susceptibility gene 1 (*BRCA1*) localized to chromosome 17q21, and breast cancer susceptibility gene 2 (*BRCA2*) localized to chromosome 13q12-13. Normally, BRCA1 and BRCA2 are genes that help prevent cancer from developing. They repair cell damage so breast cells can grow normally. Everyone has BRCA genes. But, when BRCA is mutated, it cannot function normally and breast cancer risk increases. Having a mutation in either of these two genes give a patient an estimated 87 percent risk of breast cancer and a 50 percent risk of ovarian cancer. These mutations are passed down within a family. In the case of Mrs. Jolie, she had lost her mother, grandmother and aunt to cancer.

A family member who has breast or ovarian cancer will have the BRCA gene test first. If this individual doesn't carry the BRCA gene mutation, then other family members won't benefit from taking the test. Screening for breast cancer will not decrease the chance that cancer will develop. However, screening for breast cancer helps to detect breast cancer early when it is most treatable. Intensive breast cancer screening starts at age 25 for BRCA-positive women, Clinical breast exam is recommended every 6-12 months starting at age 25. Between ages 25 and 29, it is recommended that annual breast MRI be performed. Between age 30 and 75, annual breast MRI AND mammography is recommended. It is recommended that women who carry BRCA mutations undergo breast self exam, beginning at age 18.

Despite often considered being a female disease, male BRCA carriers should begin self breast exams and undergo chest wall exams every 6-12 months starting at age 35. At age 40, a baseline mammogram may be considered. Depending on the results and amount of breast tissue, annual mammograms may be recommended.

Even after surgery a person with a BRCA mutation who has risk-reducing surgery still has residual ovarian cancer risk in the neighborhood of 3 to 4 percent. After risk-reducing surgery, patients are usually monitored through blood tests, such as CA-125.

Either the mother or the father pass on a mutation in BRCA1 or BRCA2 to either a son or daughter. The same 50-50 chance is present to pass along either the normal or mutated gene. Gene mutations in *BRCA1* and *BRCA2* do not skip a generation. Many BRCA carriers accept the 50% risk of passing on a BRCA mutation to their children. Some parents choose to use reproductive technologies, such as preimplantation genetic diagnosis (PGD).

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