BRCA Testing – What is it? Should I get it?

What is BRCA Gene Testing?

- BRCA gene testing, also known as BRACAnalysis, is a blood test that helps evaluate a person's risk for developing certain types of breast cancer.
- The test evaluates two genes, *BRCA1* and *BRCA2*, called breast cancer susceptibility genes. Other breast cancer genes exist, but identifying individuals who carry a mutation in BRCA1 or BRCA2 (damaged version of the gene) is very important because the breast cancer risk associated with BRCA1 and BRCA2 can be as high as 50-80% over a woman's lifetime. Mutations in these genes also cause ovarian cancer in 10-40% of women who carry a mutation. Of all of the breast cancer genes that exist, the cancer risk is highest with BRCA1 and BRCA2.

What does the BRCA gene do?

- The *BRCA1* and *BRCA2* genes are tumor suppressor genes. They function normally to repair damaged DNA.
- When a person is born with a mutation in either gene, DNA damage that normally occurs throughout life is not repaired correctly. The accumulation of damaged DNA in breast and ovarian tissue ultimately leads to cancer development in the majority of women who carry a mutation.

Should I be tested if I or a family member has had breast cancer?

- There are many important issues involved in genetic testing for breast and ovarian cancer susceptibility, and testing should only be undertaken after genetic counseling has been provided in order to thoroughly address the risks, limitations, and benefits of DNA testing.
- There is no simple list of criteria indicating which individuals should undergo testing. The following features indicate that the probability of detecting a mutation is high enough to warrant consideration of testing. However, even some families who do not meet these criteria will transmit a BRCA mutation. For that reason, it is important to discuss with your doctor any family history of cancer.
  <u>Genetic counseling and consideration of testing should be undertaken if:</u>
  - A *BRCA1* or *BRCA2* mutation has been discovered in your family
  - Breast cancer developed at a very young age (under age 40) in you or in a close relative
  - 2 members of your family were diagnosed with either breast cancer under age 50 or ovarian cancer at any age
  - -3 family members were diagnosed with breast cancer or ovarian cancer at any age
  - a male relative was diagnosed with breast cancer
  - Your family is of Ashkenazi Jewish descent and there is at least one case of breast cancer under age 50, or 2 cases of breast cancer at any age, or one case of ovarian cancer at any age.
- The prevalence of *BRCA1* mutations in the general population is estimated to be 0.12% and the risk of *BRCA2* mutations is estimated at 0.044%, this number increases to 2% in people of Ashkenazi Jewish descent.

How do I get tested?

- Talk with your doctor. After reviewing your family history, your doctor may refer you to a health care provider who specializes in genetic counseling and cancer risk counseling, or your doctor may discuss with you the risks, limitations, and benefits of testing and the options for reducing your cancer risk. Either way, after you have undergone thorough counseling and discussion about the probability that BRCA testing will be helpful in determining your risk for developing breast and ovarian cancer, you and your healthcare provider will decide whether or not testing is right for you.

Does BRCA testing detect all breast cancers?

- BRCA testing does not detect breast cancer, it helps asses a patient's risk of developing breast or ovarian cancer in the future.
- 5% of all breast cancers and 10% of all ovarian cancers are attributable to BRCA mutations
- Mutations in the BRCA genes are only responsible for about 20% of the familial risk of breast cancer that exists. The majority of the familial risk for breast cancer is due to genes that are not yet identified.
- There are other very rare heritable syndromes associated with breast cancer, which are not associated with *BRCA1* or *BRCA2* mutations. These include Li-Fraumeni syndrome, certain forms of hereditary nonpolyposis colon cancer, Cowden's disease, ataxia-telangiectasia, and Puetz-Jeghers syndromes. Together, these syndromes account for less than 5% of familial breast cancer risk.
- Additionally, several more common breast cancer genes are known to exist, but these genes have much less of an impact on a woman's chance of developing breast cancer, and the majority of genes in this category have not yet been identified. Commercial testing for some of these common genetic variants has been available on a limited basis for the last few years. Unlike DNA testing for the BRCA genes, the usefulness of testing for these genetic variants in order to predict breast cancer risk is unknown at this time. Also, the commercial tests that have been developed to determine an individual's "genetic risk profile" for developing breast cancer have not been adequately validated. Many more genes of this variety remain to be identified, and DNA testing for these genes as a means of predicting breast cancer risk is not recommended at this time.

If I am BRCA positive what should I do?

- In patients with *BRCA1* mutations the lifetime risk of breast cancer ranges between 50-87% and the lifetime risk of ovarian cancer is between 20-45%.
- Carriers of the mutation may also have increased risk for colon cancers.
- *BRCA2* mutations increase the lifetime risk for breast cancer to 45-84% and the risk of ovarian cancer to 10-20%.
- Males with *BRCA2* mutations have a 6% lifetime risk of developing breast cancer and an elevated risk of prostate cancer. Both male and female BRCA2 carriers are at increased risk for pancreatic cancer, colon cancer, and melanoma.

Management of cancer risk in BRCA carriers requires a multidisciplinary strategy that may include preventive surgeries and enhanced cancer surveillance testing. Due to the high risk of cancer in these individuals, it is recommended that a comprehensive cancer prevention plan is developed by health care providers with experience in managing individuals with hereditary cancer risk.

How much does BRCA testing cost? Is it covered my insurance?

- The test costs approximately $3000, but it may be covered under your health insurance. Myriad Genetics Laboratory performs the testing and has an assistance program to help cover the cost for some uninsured patients who meet certain financial requirements.

Can I lose my health insurance coverage if I test positive?

- The government put into place the Genetic Information Nondiscrimination Act (GINA), which protects Americans from possible discrimination from health insurance companies and employers based on their genetic make-up.
- Under this series of laws, health insurance companies cannot:
  - increase your premiums based on genetic results
  - require a family member to undergo testing
  - use the information to claim a patient has a pre-existing condition
- Employers cannot force a patient to undergo genetic testing and cannot hire, fire, or promote employees based on genetic information.

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Resources

Berek, JS, Hacker, NF. *Berek and Hacker's Gynecologic Oncology*. 5th ed. Philadelphia, PA. Lippincott Williams & Wilkins: 2009.

http://www.cancer.gov/cancertopics/factsheet/Risk/BRCA

http://www.myriadtests.com/index.php?page_id=68