

Spotlight on Health

Hereditary Breast Cancer

Breast cancer is the most common type of cancer and the second leading cause of cancer death for women in the United States.¹ Fortunately, if diagnosed and treated early, certain types of breast cancer have a 99% survival rate.¹ Early diagnosis begins with identifying individuals with common risk factors (see Sidebar), which include family history.² In fact, approximately 5% to 10% of breast cancer cases are hereditary.³ Genetic testing can identify women (and men) who are at increased risk for hereditary breast cancer (see Sidebar). Individuals at increased risk may benefit from more frequent surveillance, or from treatments such as prophylactic mastectomy.^{3,4}

This newsletter will discuss hereditary breast cancer, and how genetic testing can be used to assess risk.

Genes Associated With Hereditary Breast Cancer

Inherited variants in the breast cancer susceptibility 1 and 2 genes (*BRCA1* and *BRCA2*) increase the risk of breast cancer, and account for 20% to 25% of hereditary breast cancers.³ Other genes associated with hereditary breast cancer include *ATM*, *BARD1*, *CDH1*, *CHEK2*, *NF1*, *PALB2*, *PTEN*, *STK11*, and *TP53*.³

Genetic Testing and Counseling

Professional organizations recommend that primary care providers assess if women (or men) may be at increased risk of having mutations in *BRCA1* or *BRCA2* based on personal or family history.³⁻⁵ The recent update to the United States Preventive Services Task Force (USPSTF) guidelines expands the population for screening.⁶ These guidelines now include women considered cancer-free who have been previously treated for breast, ovarian, peritoneal, or tubal cancers.⁶ In addition, ancestry associated with *BRCA1/2* (founder) gene mutations is more explicitly included as a risk factor.⁶

Screening tools to help assess the risk of developing breast cancer include the National Cancer Institute Breast Cancer Risk Assessment Tool, commonly known as the Gail model (BCRiskTool.Cancer.gov). Quest Diagnostics also has an online quiz for patients to help determine if they are at increased risk of hereditary cancer (QuestVantage.com). Patients may also benefit from seeing a genetic counselor to discuss the risks, benefits, and limitations of genetic testing. Local genetic counselors can be found by visiting the National Society of Genetic Counselors website (FindAGeneticCounselor.com).

After screening, at-risk individuals should receive genetic counseling and, if indicated after counseling, genetic testing.³⁻⁶ Individuals with test results indicating the presence of breast cancer-associated mutations may also be at risk for other cancers, such as ovarian, pancreatic, or prostate (men) cancer.^{3,4} Unfortunately, 4 out of 5 women who meet the criteria for hereditary breast cancer testing are not being tested.⁷

Men with *BRCA1* or *BRCA2* mutations are also at increased risk of breast cancer: men with a *BRCA2* mutation have a lifetime risk of breast cancer of 7% to 8%, as compared to approximately 0.1% for men with no mutations.⁴ The National Comprehensive Cancer Network (NCCN) recommends mutation testing for men who have had breast cancer, and for those with certain personal and family medical histories.⁴



Breast Cancer Risk Factors

Some of the risk factors for breast cancer that *all* women should be aware of include²

- Age: being over 50
- Menstruation: starting < age 12
- Menopause: starting > age 55
- Dense breasts
- Previous treatment with radiation therapy
- Diet and lifestyle: smoking, excessive alcohol, physical inactivity, overweight
- Family history: close relatives with certain types of cancer

The risk of having a gene variant associated with *hereditary breast cancer* is higher in individuals with³⁻⁵

- A personal or family history of
 - breast cancer < age 50
 - cancer involving both breasts
 - a *BRCA*-related cancer (ie, breast, ovarian, pancreatic, prostate)
 - a rare cancer, such as sarcoma
- A male family member with breast cancer
- Multiple family members with breast cancer
- An Ashkenazi Jewish ethnicity

Direct-to-Consumer Genetic Testing

Direct-to-consumer testing for *BRCA* gene mutations is currently available to patients. However, the American College of Obstetricians and Gynecologists (ACOG) and other professional organizations consider the interpretation of positive or negative results “problematic,” and recommend “that women should only pursue this type of genetic testing under the care of a provider with experience and expertise in cancer genetics.”⁸ In addition, the Food and Drug Administration (FDA) recommends that direct-to-consumer *BRCA* test results not be used to determine any treatments; patients should have genetic counseling and confirmatory testing before any treatment decisions are made.⁹

How Healthcare Providers Can Help

Healthcare providers can identify patients at risk for hereditary breast cancer by taking a thorough personal and family history. Individuals at increased risk for hereditary breast cancer may be referred to a genetic counselor or provided with information regarding genetic testing. Appropriate screening and testing can help ensure timely interventions that can improve survival.⁵

For women at increased risk of hereditary breast cancer, options to reduce risk include³

- Increased surveillance breast examinations (eg, mammography, magnetic resonance imaging)
- Chemoprevention medications such as tamoxifen
- Surgery such as prophylactic/risk-reducing mastectomy

How the Laboratory Can Help

Quest offers the BRCAvantage[®] Comprehensive test (test code 91863), which tests for variants in the 2 high-risk genes (*BRCA1* and *BRCA2*) predominantly associated with breast cancer. Quest also offers the MYvantage[®] Hereditary Comprehensive Cancer Panel (test code 93768), which tests for variants in *BRCA1*, *BRCA2*, and 32 other genes associated with common cancers. For people of Ashkenazi Jewish descent, Quest offers the BRCAvantage[®] Ashkenazi Jewish Screen (test code 91864) for the 3 *BRCA* variants commonly found in this population.

Board-certified genetic counselors are also available for consultation with healthcare providers at 1.866.GENE.INFO (1.866.436.3463) or at GenelInfo@QuestDiagnostics.com.

Quest also offers webinars to aid in understanding genetic testing for hereditary cancers. They are available at

- [QuestDiagnostics.com/presentations/which-of-your-patients-should-be-offered-genetic-testing-for-cancer-risk-in-2019-?presentation_id=450](https://www.questdiagnostics.com/presentations/which-of-your-patients-should-be-offered-genetic-testing-for-cancer-risk-in-2019-?presentation_id=450)
- [QuestDiagnostics.com/presentations/genetic-testing-when-should-you-consider-testing-beyond-brca-?presentation_id=455](https://www.questdiagnostics.com/presentations/genetic-testing-when-should-you-consider-testing-beyond-brca-?presentation_id=455)

Quest can also help verify insurance coverage of the test and estimate out-of-pocket expenses exceeding \$100, before testing. Financial assistance may be available for qualified low-income patients. Please visit [QuestVantage.com](https://www.questdiagnostics.com) for more details.

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