

## Symptoms >

**🕒 If you are experiencing new, severe, or persistent symptoms, contact a health care provider.**

In many cases, symptoms may go unnoticed until it becomes severe and may include:

- A lump or mass in the breast that feels different from the surrounding tissue
- Change in the shape, size, or appearance of the breast
- Discharge from the nipple
- Breast rash
- Changes in the skin over the breast, for example, dimpling
- Breast pain
- Inverted or pulling-in of the nipple
- Scaling, peeling, or flaking skin over the breast, particularly the dark area around the nipple
- Redness and/or pitting of the breast skin, resembling the skin of orange

## Causes >

The exact cause is not known.

The risk factors include:

- Family history
- Hormonal changes
- Age -at more risk after 40 years of age
- Personal history of breast cancer: A cancer in one breast increases the chances of having cancer in the other breast
- Lifestyle, including excess of alcohol consumption
- Environmental factors, including exposure to radiations
- Obesity and over weight
- Menarche: having periods at younger age and menopause at an older age
- Pregnancy: Becoming pregnant at an older age or never being pregnant
- Hormone use, including long-term contraceptive use or postmenopausal Hormone therapy

## Prevention >

Preventive measures involves healthy habits such as:

- Eat healthy and nutritious food
- Avoid alcohol
- Practice gentle exercises upon doctor's advice
- Visit doctor for regular examination
- Preventive surgery may be recommended in women with high risk
- To reduce the risk of developing cancer get the pre screening done

## Complications >

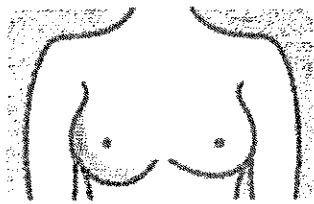
- Spread of cancer to other organs or bones and resulting symptoms are the complications associated with advanced stages of breast cancer.
- Cancer treatment is associated with complications such as lymphedema, pain, and sickness.

# SYMPTOMS OF **BREAST CANCER**

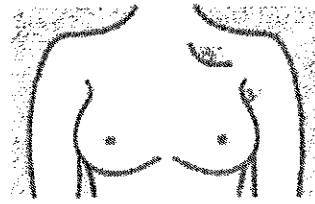
## WHAT TO WATCH FOR:



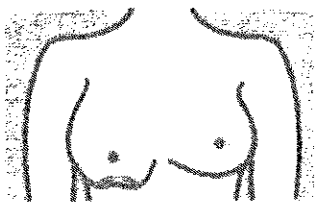
Lumps, usually hard



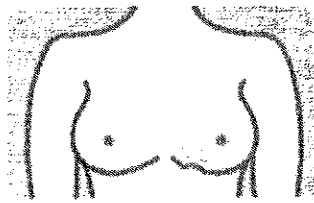
Swollen area



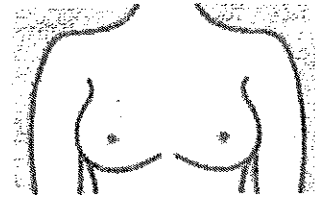
Lumps, swelling near armpit or collarbone



Change in breast size or shape



Dimpled skin



Flaky, thickened, or discolored skin



Pain or tender spots



A nipple that turns inward



Nipple discharge (not breast milk)

**NOTE: MANY PEOPLE HAVE NO SYMPTOMS.**

If you have breast cancer, chances are it's not caused by a faulty gene you were born with. Most of the time, genes that lead to the disease mutate sometime during your life and aren't an inherited problem.

But in about 5% to 10% of cases, the cause is hereditary. This means that the cancer is due to a gene change, called a "mutation," that's passed down from a parent.

Researchers have identified hundreds of genes linked to breast cancer, but some seem to play more of a role than others.

Just because you have an inherited gene mutation doesn't mean you'll definitely get breast cancer. It only means you have a greater chance of it happening.

## **How Are Gene Mutations Inherited?**

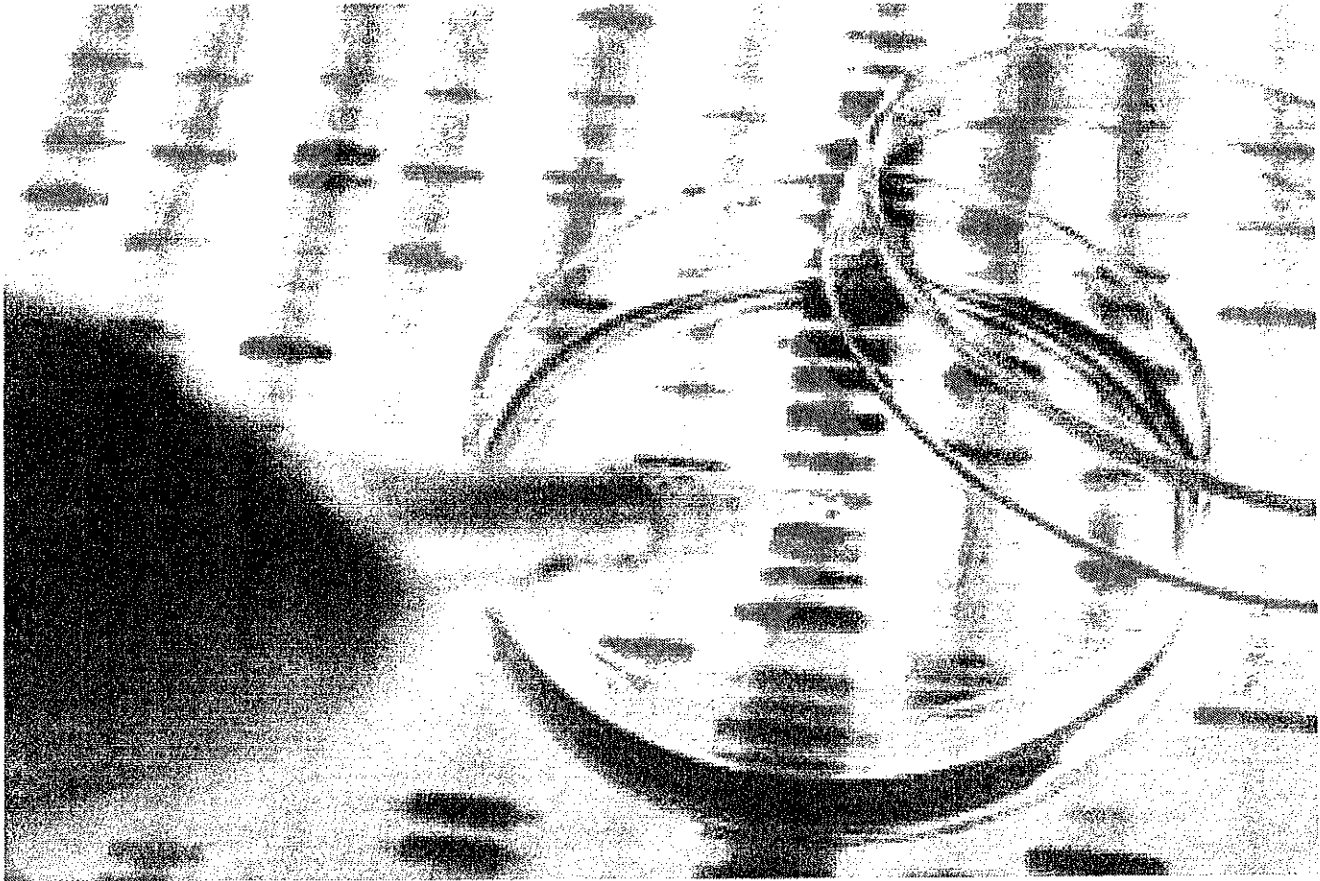
If you inherit a gene mutation for breast cancer, it means that you got it from one or both of your parents.

Many mutations, such as those found in the well-known BRCA1 and BRCA2 genes, are passed down in what's called an autosomal dominant pattern. This means that inheriting one bad gene from one parent may lead to an increased chance of disease.

If one of your parents has an autosomal dominant gene mutation, there's a 50% chance you'll inherit it. This is why we see the disease in many relatives, but not all of them.

## **Genetic Testing for Breast Cancer Genes**

Genetic tests can tell you if you have an inherited gene mutation for breast cancer. You can have a test that looks



### **Genetic testing for breast cancer.**

for an individual gene abnormality or a larger panel test that examines several genes at one time. Experts usually recommend gene testing if you have breast cancer or strong risk factors, such as a family history of hereditary cancers. Talk to your doctor if you'd like to learn more about genetic testing.

## **Should I Be Tested for Genetic Mutations?**

At-risk families can take blood tests to look for mutations in these genes.

You may want to discuss genetic testing with your doctor if:

- You have two or more blood relatives – mother, sister, aunt, cousin, or daughter – with premenopausal breast cancer or ovarian cancer diagnosed at any age.
- You were diagnosed with breast cancer, especially before menopause, and have a blood relative with breast or ovarian cancer.
- You were diagnosed with ovarian cancer and you have blood relatives who have had ovarian or breast cancer.

- A male in your family has or had breast cancer.
- You or a family member has been diagnosed with bilateral breast cancer (cancer in both breasts).
- You were diagnosed with triple-negative breast cancer before the age of 60.
- You are related to someone (male or female) who has a BRCA1 or BRCA2 mutation.
- You are of Ashkenazi Jewish descent and have had breast or ovarian cancer or have blood relatives who have had breast or ovarian cancer.
- You may also want to consider testing if you are a Black woman. Black women are just as likely to have hereditary breast cancer mutations as white women, but tend not to get tested as frequently, putting you at a higher risk of the cancer going undetected.

Counseling is required before having genetic testing for breast cancer. During this educational session, a health care provider will explain the benefits and risks of genetic testing and answer any questions you may have.

You'll also have to sign a consent form. It's an agreement between you and your health care provider, showing that you have discussed the tests and understand how the results might affect you and your family.

Here are some questions to consider when thinking about genetic testing:

- Am I prepared to cope with the result? Are my family members also prepared, including my children and my spouse?
- What are my goals for testing?
- How would I use my test results? What will I do differently if the results are positive or negative?
- With whom will I share my results?
- Would a positive test result change relationships with my family?

The Health Insurance Portability and Accountability Act (HIPAA) of 1996 prevents insurance companies from denying coverage based on genetic information. This act also prevents insurance companies from using genetic information to determine that a health condition existed before application was made for insurance. In addition, many states have passed laws, or have legislation pending, addressing insurance concerns.

## **What Happens During Genetic Testing?**

The genetic counselor will do a family pedigree to detect high-risk patterns. A family pedigree is a chart that shows the genetic makeup of a person's relatives. It's used to analyze traits or diseases that are passed down through a family.

Then, you'll have a blood test to learn whether you have a breast cancer gene. Keep in mind that the vast majority of breast cancer cases are not linked to a breast cancer gene. In addition, scientists do not know all of the genes that can cause breast cancer, so they can test you only for the known genes.

When someone with a cancer diagnosis and a family history of the disease is found to have an altered BRCA1 or BRCA2 gene, the family is said to have a "known mutation." If there's a link between the development of breast cancer and a breast cancer gene, then all family members willing to have genetic testing are asked to give a sample of blood. For many people, knowing their test results is important because this information may help to guide health care decisions for themselves and their families.

## **Can I Do Genetic Testing at Home?**

Yes. There are several options for genetic testing that can be done on your own. Companies like Veritas Genetics and Color Genomics offer testing kits that look for BRCA1 and BRCA2. You will need a doctor's approval to order the kits. Both companies can connect you with a health care provider to get the necessary approval and help explain the results. These tests are usually more affordable (\$200-\$300) than tests ordered through a hospital but can miss key mutations that could clue doctors into a possible breast cancer diagnosis.

## **How Do I Interpret the Genetic Test Results?**

A negative genetic test means that a breast cancer gene mutation was not identified. If other genetic testing has identified a mutation in your family, a negative test means you do not have the specific mutation. Therefore, your risk of cancer is the same as someone in the general population who has a family history of breast cancer.

If a BRCA1 or BRCA2 mutation has not been previously found in your family, a negative result should be interpreted cautiously. There is still a chance that you may have a higher risk for breast cancer because of changes in genes other than those that doctors can test for.

A positive test result means that a mutation known to raise the risk of breast and ovarian cancers was identified.

## **What Are the Pros and Cons of Genetic Testing for Breast Cancer?**

Genetic testing is not 100% accurate. If a test is negative, a person still has a chance of getting breast cancer. If the test is positive, there is still a chance of not getting breast cancer.

Genetic testing is costly, ranging from about \$400 to more than \$3,000, depending on the type of test. Insurance coverage varies.

The results of genetic tests won't be available for several weeks. The length of time it takes to get results depends on the tests performed and under what circumstances they are done.

Legislation has been enacted to protect people who may have a documented genetic risk of cancer from employment or insurance problems. The best thing you can do is to become involved with an established genetic registry that can counsel people who have a genetic risk for cancer.

But for some people, genetic testing may help you make informed medical and lifestyle decisions while easing the anxiety of not knowing your genetic background. You can also make a decision regarding prevention, with both medications and prophylactic surgery. In addition, many people take part in medical research that, in the long run, may lower their risk of death from breast cancer.

## **Related Article**

## **What Are My Options if I Have a 'Cancer Gene'?**

If your genetic testing shows you have a mutation linked to cancer, there are still several steps you can take to lower your chances for developing breast cancer.

- Maintain a healthy weight.
- Stay physically active. The American Cancer Society recommends you get at least 150 to 300 minutes of moderate-intensity or 75 to 150 minutes of vigorous-intensity activity each week. Moderate activity can be something like a quick-paced walk, while vigorous activity would have you breaking a sweat.
- Limit alcohol intake.
- Studies show decreased risks of breast cancer for women who breastfeed for several months after giving birth.



- The American Cancer Society recommends choosing non-hormonal options to treat menopause symptoms instead of hormone therapy.

If you have an increased risk, you can also consider counseling to help navigate the emotions surrounding the test results, and speaking with a health care professional about next steps.

## **Common Breast Cancer Mutations**

Researchers have identified several key gene changes linked to breast cancer. Some of these pose a high risk, while others seem to be less significant.

### **BRCA1 and BRCA2**

The BRCA1 (breast cancer gene one) and BRCA2 (breast cancer gene two) inherited gene mutations are the most common cause of hereditary breast cancer. Mistakes in these genes account for up to 10% of all breast cancers. BRCA mutations also raise your chances for ovarian cancer, pancreatic cancer, and, in men, prostate cancer. A BRCA mutation may raise your chances of colon cancer. Women with a BRCA1 or BRCA2 mutation have up to a 72% chance of breast cancer during their lifetime.

### **PALB2**

Normally, the PALB2 gene makes a protein that works with the BRCA2 gene protein to repair damaged DNA and stop tumor growth. But defects in the gene can lead to a higher likelihood of breast cancer. Some studies suggest that women with a PALB2 mutation have a 14% chance of breast cancer by age 50 and a 35% chance by age 70.

### **PIK3CA**

The PIK3CA gene gives instructions to make a protein that's important for many cell functions. A PIK3CA mutation isn't inherited – you can't pass it down to your children. Instead, it's a mutation that you develop during your life, called a sporadic mutation. PIK3CA gene mutations are found in about 30% to 40% of breast cancers. It's important to know your tumor's PIK3CA status because it may affect how your doctor treats your cancer. Surgeons can remove tissue in your tumor (called a biopsy) to test your breast tumor for a PIK3CA mutation, or in some cases, a blood test can find the defect.

## **HER2**

The HER2 gene makes a protein called HER2 (human epidermal growth factor receptor 2). This protein is found on the surface of all breast cells and that helps them grow. If the HER2 gene malfunctions and makes too many copies of itself, it tells cells to make too much HER2 protein. This causes the cells to grow out of control.

Like PIK3CA, HER2 is not an inherited gene mutation. Most breast cancer is HER2-negative. Research suggests about only 10% to 20% of cases are HER2-positive. This means there's a change in the HER2 gene that makes breast cells grow and divide out of control. If you have invasive breast cancer, your doctor will probably test your tumor tissue for HER2 after you have a biopsy.

## **PTEN**

PTEN is a gene that helps control cell growth. An inherited change in PTEN can cause Cowden syndrome, a disorder that puts you at risk for cancerous and noncancerous breast tumors and other growths. Women with a PTEN mutation have a lifetime breast cancer chance of between 25% and 50%, though some studies suggest the odds are even higher.

## **TP53**

The TP53 gene helps stop the growth of cells that have damaged DNA. An inherited TP53 mutation causes Li-Fraumeni syndrome, a disorder that ups your chances of breast cancer, leukemia, brain tumors, and cancers called sarcomas. One study found women with Li-Fraumeni syndrome have a 54% chance of breast cancer by age 70.

## **ATM**

The ATM gene normally helps repair damaged DNA, but some people who inherit one bad copy of the gene are at high risk for breast cancer and pancreatic cancer. Research suggests the lifetime chance of breast cancer for those who carry an ATM mutation is between 33% and 38%. Those who have a type of mutation that affects a specific location on the ATM gene have a 69% lifetime chance.

## **CDH1**

CDH1 makes a protein that helps cells bind together to create tissue. People with a faulty CDH1 gene are more likely to develop a rare type of stomach cancer. Women with this

mutation also have a 39% to 52% lifetime chance of invasive lobular breast cancer (breast cancer that starts in the lobules of the breast, the glands that make milk).

## **Which Men Are More Likely to Get Breast Cancer?**

It's rare for a man under age 35 to get breast cancer. Your chance of getting breast cancer goes up with age. Most breast cancers in men happen between ages 60 and 70.

Other things that raise the odds for male breast cancer include:

- Breast cancer in a close female relative
- History of radiation exposure of the chest
- Enlarged breasts (gynecomastia) because of drug or hormone treatments, some infections, or poisons
- Taking estrogen
- A rare genetic condition called Klinefelter's syndrome
- Severe liver disease, called cirrhosis
- Diseases of the testicles such as mumps orchitis, a testicular injury, or an undescended testicle
- Obesity

## **Symptoms**

Symptoms of breast cancer in men are similar to those in women. Most male breast cancers are diagnosed when a man finds a lump on his chest.

But men tend to delay going to the doctor until they have more severe symptoms, like bleeding from the nipple. By that point, the cancer may have spread.

## **Diagnosis and Treatment**

The same techniques that are used to diagnose breast cancer in women are used in men: physical exams, mammography, and biopsies (looking at small samples of tissue under a microscope).

Treatments for men and women are generally the same. Many men benefit from a combination of treatments, such as:

- Surgery. The typical treatment for men is a mastectomy, in which your entire breast is removed. Breast-conserving surgery -- in which only the tumor is taken out -- is sometimes

done. Often, the surgeon also takes out one or more lymph nodes to see if the cancer has spread.

- Radiation therapy. You may have treatment with radioactive rays or particles after surgery. It can help kill off any cancer cells that surgery missed. If the cancer is inoperable, radiation may be your main treatment.
- Chemotherapy. With this treatment, you'll be given drugs -- by mouth or by injection -- to attack the cancer cells. You may have chemotherapy after surgery to lower the risk of the cancer coming back. For men with advanced cancer or cancer that has spread to other parts of the body, chemotherapy may be the primary treatment.
- Hormone therapy. Some kinds of breast cancer need certain hormones to grow. This therapy blocks the effects of these hormones, stopping the cancer's growth. It often works better in men than in women because about 90% of men's cancers are hormone receptor-positive. The drug tamoxifen is the standard hormone therapy for male breast cancer. Sometimes, removal of the testes reduces the amount of certain male hormones in the system. Men with breast cancer should never take testosterone, because it causes breast cancer cells to grow. You may have hormone therapy after surgery to lower the risk of the cancer coming back. For men with locally advanced or metastatic cancer, it may be the primary treatment.
- Targeted therapy. Some men have an excess of a protein (HER2) that makes cancer spread quickly. Trastuzumab (Herceptin) is one of the drugs that has been approved to treat breast cancer that has spread to other areas of the body. It stops this protein from making cancer cells grow. It may also boost your immune system, giving it more strength to fight the cancer.

## Symptoms of Breast Cancer in Dogs

Most of the signs of breast cancer are related to the tumors themselves and are located on one of the eight to ten mammary glands present on most female canines. The majority of tumors are found near the mammary glands closest to the back legs. Signs can include:

- Bloody discharge or pus from nipple
- Multiple bumps
- Painful or swollen breasts
- Singular lumps
- Ulceration
- Yellow discharge or pus from nipple

Systemic symptoms that might indicate cancer could include:

- Breathing difficulties
- Coughing
- Lameness
- Lethargy
- Loss of appetite
- Weakness
- Weight loss
- Enlarged lymph nodes

# What Are Cat Mammary Gland Tumors?

Cat mammary gland tumors are formed by an abnormal mass of cells in the mammary (breast) glands. They can be benign (noncancerous) or malignant (cancerous).

Mammary gland tumors are most common in middle-aged and older female cats, but they can occur in younger female cats, as well as male cats.

## Symptoms of Cat Mammary Gland Tumors

The most common symptom of a cat mammary gland tumor is a lump or swelling along the cat's mammary chain, which is the line of breast tissue and nipples along your cat's belly.

The mass may be soft or firm, widespread or clearly defined. You may also see ulceration (sores) as well as discharge from the nipples.

In cases of metastasis, where the tumor has spread, you may see other signs of illness, such as difficulty breathing when cancer is also in the lungs. Your vet may also see lymph node swelling.

In the later stages of malignant disease, cats lose weight, and a weakened immune system can lead to systemic infections.

## Causes of Cat Mammary Gland Tumors

The reason why a particular cat may get a mammary gland tumor is not entirely understood. Some cats have a genetic predisposition to develop cancer.

The risk of cancer also increases with age and exposure to carcinogens, which are cancer-causing agents like pesticides.

While we aren't always able to fully control our cat's environment and genetics, we *can* control the largest single factor that increases our cat's risk of developing mammary tumors. That factor is exposure to the sex hormone estrogen.

Early spaying reduces your cat's exposure to hormones such as estrogen and progesterone. Too many of these hormones can cause the abnormal growth of mammary tumors in cats.

When your veterinarian surgically removes your cat's ovaries and uterus by spaying at an early age, it significantly decreases the risk that your cat will develop mammary cancer.

However, spaying is not a treatment for cat mammary gland tumors if cancerous disease has already spread throughout your cat's body. This makes early spaying—before your cat's first heat cycle—so important.



## Breast Cancer Screening Guidelines for Women

	U.S. Preventive Services Task Force <sup>1,2</sup>	American Cancer Society <sup>3</sup>	American College of Obstetricians and Gynecologists <sup>4,5,6</sup>	International Agency for Research on Cancer <sup>7</sup>	American College of Radiology <sup>8,9</sup>	American College of Physicians <sup>10</sup>	American Academy of Family Physicians <sup>11</sup>
Women aged 40 to 49 years with average risk	The decision to start screening with mammography in women prior to age 50 years should be an individual one. Women who place a higher value on the potential benefit than the potential harms may choose to begin screening once every two years between the ages of 40 and 49 years.	Women aged 40 to 44 years should have the choice to start breast cancer screening once a year with mammography if they wish to do so. The risks of screening as well as the potential benefits should be considered. Women aged 45 to 49 years should be screened with mammography annually.	After counseling and if an individual desires screening, mammography may be offered once a year or once every two years and clinical breast exams may be offered once a year. Decisions between screening with mammography once a year or once every two years should be made through shared decision-making after appropriate counseling.	There is limited evidence that screening with mammography reduces breast cancer mortality in women 40-49 years of age.	Screening with mammography is recommended once a year.	Clinicians should discuss whether to screen for breast cancer with mammography before age 50 years. Discussion should include the potential benefits and harms and a woman's preferences. The potential harms outweigh the benefits in most women aged 40 to 49 years.	The decision to start screening with mammography should be an individual one. Women who place a higher value on the potential benefit than the potential harms may choose to begin screening.
Women aged 50 to 74 years with average risk	Screening with mammography once every two years is recommended. The evidence is insufficient to assess the additional benefits and harms of clinical breast examination.	Women aged 50 to 54 years should be screened with mammography annually. For women aged 55 years and older, screening with mammography is recommended once every two years or once a year. Women aged 55 years and older should transition to biennial screening or have the opportunity to continue screening annually. Among average risk women, clinical breast examination to screen for breast cancer is not recommended.	Screening with mammography is recommended once a year or once every two years. Decisions between screening with mammography once a year or once every two years should be made through shared decision-making after appropriate counseling. Clinical breast exams may be offered annually. Clinical breast exams should be offered in the context of a shared, informed decision-making approach that recognizes the uncertainty of additional benefits and harms of clinical breast examination beyond screening mammography.	There is sufficient evidence that screening with mammography reduces breast-cancer mortality to an extent that its benefits substantially outweigh the risk of radiation-induced cancer from mammography. There is inadequate evidence that clinical breast examination reduces breast cancer mortality. There is sufficient evidence that clinical breast examination shifts the stage distribution of tumors detected toward a lower stage.	Screening with mammography is recommended once a year.	Clinicians should offer screening with mammography once every two years. In average-risk women of all ages, clinicians should not use clinical breast examination to screen for breast cancer.	Screening with mammography is recommended once every two years. Current evidence is insufficient to assess the benefits and harms of clinical breast exams.

	U.S. Preventive Services Task Force <sup>1,2</sup>	American Cancer Society <sup>3</sup>	American College of Obstetricians and Gynecologists <sup>4,5,6</sup>	International Agency for Research on Cancer <sup>7</sup>	American College of Radiology <sup>8,9</sup>	American College of Physicians <sup>10</sup>	American Academy of Family Physicians <sup>11</sup>
Women aged 75 years or older with average risk	Current evidence is insufficient to assess the balance of benefits and harms of screening mammography in women aged 75 years or older.	Women should continue screening with mammography as long as their overall health is good and they have a life expectancy of 10 years or more.	The decision to stop screening should be based on a shared decision-making process. The decision-making process should include a discussion of the woman's health status and longevity. Other than screening with mammography, the organization does not recommend routine use of alternative or additional tests. Health care providers should comply with state laws that may require disclosure to women of their breast density as recorded in a mammogram report.	Not addressed.	The age to stop screening with mammography should be based on each woman's health status rather than an age-based determination. In addition to mammography, contrast-enhanced breast MRI is also recommended. After weighing benefits and risks, ultrasound can be considered for those who cannot undergo MRI.	In average-risk women aged 75 years or older or in women with a life expectancy of 10 years or less, clinicians should discontinue screening for breast cancer. There is insufficient evidence on benefits and harms of screening strategies in women who have dense breasts.	Current evidence is insufficient to assess the balance of benefits and harms of screening with mammography. Current evidence is insufficient to assess the balance of benefits and harms of adjunctive screening for breast cancer using breast ultrasonography, MRI, DBT, or other methods.
Women with dense breasts	Current evidence is insufficient to assess the balance of benefits and harms of adjunctive screening for breast cancer using breast ultrasonography, magnetic resonance imaging (MRI), digital breast tomosynthesis (DBT), or other methods in women identified to have dense breasts on an otherwise negative screening mammogram.	Evidence is insufficient to recommend for or against yearly MRI screening.		There is inadequate evidence that ultrasonography as an adjunct to mammography reduces breast cancer mortality. There is limited evidence that ultrasonography as an adjunct to mammography increases the breast cancer detection rate. There is sufficient evidence that ultrasonography as an adjunct to mammography increases the proportion of false positive screening outcomes.			

### Women at high risk

Some organizations release different breast cancer screening guidelines for women who are considered to be at high risk of developing breast cancer. Different screening guidelines may be suggested for women who have risk factors such as BRCA1 or BRCA2 mutation, who are an untested family member of someone who has a BRCA1 or BRCA2 mutation, who have a history of mantle or chest radiation which occurred before age 30 years, or who have a lifetime breast cancer risk of 20% or greater based on their family history. Additional information on screening guidelines for women at high risk can be found in the references.<sup>1,3,5,7,9</sup>