



## Cancer Reference Information

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### Detailed Guide: Breast Cancer

## What Are the Risk Factors for Breast Cancer?

A risk factor is anything that affects your chance of getting a disease, such as cancer. Different cancers have different risk factors. For example, exposing skin to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for cancers of the lung, mouth, larynx (voice box), bladder, kidney, and several other organs.

But having a risk factor, or even several, does not mean that you will get the disease. Most women who have one or more breast cancer risk factors never develop the disease, while many women with breast cancer have no apparent risk factors (other than being a woman and growing older). Even when a woman with breast cancer has a risk factor, there is no way to prove that it actually caused her cancer.

There are different kinds of risk factors. Some factors, like a person's age or race, can't be changed. Others are linked to cancer-causing factors in the environment. Still others are related personal behaviors, such as smoking, drinking, and diet. Some factors influence risk more than others, and your risk for breast cancer can change over time, due to factors such as aging or lifestyle.

### Risk Factors You Cannot Change

#### Gender

Simply being a woman is the main risk factor for developing breast cancer. Although women have many more breast cells than men, the main reason they develop more breast cancer is because their breast cells are constantly exposed to the growth-promoting effects of the female hormones estrogen and progesterone. Men can develop breast cancer, but this disease is about 100 times more common among women than men.

#### Aging

Your risk of developing breast cancer increases as you get older. About 1 out of 8 invasive breast cancer diagnoses are among women younger than 45, while about 2 out of 3 women with invasive breast cancer are age 55 or older when they are diagnosed.

#### Genetic Risk Factors

About 5% to 10% of breast cancer cases are thought to be hereditary, resulting directly from gene changes (called mutations) inherited from a parent. See the section, "[Do We Know What Causes Breast Cancer?](#)" for more information about genes and DNA.

**BRCA1 and BRCA2:** The most common inherited mutations are those of the BRCA1 and BRCA2 genes. Normally, these genes help to prevent cancer by making proteins that keep cells from growing abnormally. However, if you have inherited a mutated copy of either gene from a parent, you are at increased risk for breast cancer.

Women with an inherited BRCA1 or BRCA2 mutation have up to an 80% chance of developing breast cancer during their lifetime, and when they do it is often at a younger age than in women who are not born with one of these gene mutations. Women with these inherited mutations also have an increased risk for developing ovarian cancer. Although BRCA mutations are found most often in Jewish women of Ashkenazi (Eastern Europe) origin, they are also seen in African-American women and Hispanic women and can occur in any racial or ethnic group.

Other genes have been discovered that might also lead to inherited breast cancers. These genes do not impart the same level of breast cancer risk as the BRCA genes, and are not frequent causes of familial (inherited) breast cancer.

**ATM:** The ATM gene normally helps repair damaged DNA. Certain families with a high rate of breast cancer have been found to have mutations of this gene.

**CHEK2:** The CHEK2 gene increases breast cancer risk about twofold when it is mutated. In women who carry the CHEK2 mutation and have a strong family history of breast cancer, the risk is greatly increased.

**p53:** Inherited mutations of the p53 tumor suppressor gene can also increase the risk of developing breast cancer, and several other cancers such as leukemia, brain tumors, and/or sarcomas (cancer of bones or connective tissue). The *Li-Fraumeni syndrome*, named after the 2 researchers who described this inherited cancer syndrome, is a rare cause of breast cancer.

**PTEN:** The PTEN gene normally helps regulate cell growth. Inherited mutations in this gene cause *Cowden syndrome*, a rare disorder in which people are at increased risk for both benign and malignant breast tumors, as well as growths in the digestive tract, thyroid, uterus, and ovaries.

**Genetic testing:** If you are considering genetic testing, it is strongly recommended that you talk first to a genetic counselor, nurse, or doctor qualified to explain and interpret the results of these tests. It is very important to understand and carefully weigh the benefits and risks of genetic testing before these tests are done. Testing is expensive and is not covered by some health insurance plans. There have been concerns that people with abnormal genetic test results might not be able to get life insurance or that coverage may only be available at a much higher cost, but many states have passed laws that prevent insurance companies from denying insurance on the basis of genetic testing.

For more information, see the separate American Cancer Society document, *Genetic Testing: What You Need to Know*. You may also want to visit the National Cancer Institute web site ([www.cancer.gov/cancertopics/Genetic-Testing-for-Breast-and-Ovarian-Cancer-Risk](http://www.cancer.gov/cancertopics/Genetic-Testing-for-Breast-and-Ovarian-Cancer-Risk)). To learn about state laws against genetic testing discrimination, you may want to visit the web site of the National Conference of State Legislatures ([www.ncsl.org/programs/health/genetics/ndishlth.htm](http://www.ncsl.org/programs/health/genetics/ndishlth.htm)).

### Family History of Breast Cancer

Breast cancer risk is higher among women whose close blood relatives have this disease.

Having one first-degree relative (mother, sister, or daughter) with breast cancer approximately doubles a woman's risk. Having 2 first-degree relatives increases her risk about 5-fold. Although the exact risk is not known, women with a family history of breast cancer in a father or brother also have an increased risk of breast cancer. Altogether, about 20% to 30% of women with breast cancer have a family member with this disease. (It's important to note this means that 70% to 80% of women who get breast cancer do not have a family history of this disease.)

### Personal History of Breast Cancer

A woman with cancer in one breast has a 3- to 4-fold increased risk of developing a new cancer in the other breast or in another part of the same breast. This is different from a *recurrence* (return) of the first cancer.

### Race

White women are slightly more likely to develop breast cancer than are African-American women. African-American women are more likely to die of this cancer. At least part of this seems to be because African-American women tend to have more aggressive tumors, although why this is the case is not known. Asian, Hispanic, and Native-American women have a lower risk of developing and dying from breast cancer.

### Abnormal Breast Biopsy Results

Some types of benign breast conditions are more closely linked to breast cancer risk than others. Doctors often divide benign breast conditions into 3 general groups, depending on how they affect this risk: non-proliferative lesions, proliferative lesions without atypia, and proliferative lesions with atypia.

The *non-proliferative lesions* (those not associated with any overgrowth of breast tissue) do not seem to affect breast cancer risk, or if they do at all it is to a very small extent. They include:

- fibrosis
- cysts
- mild hyperplasia
- adenosis (non-sclerosing)

- simple fibroadenoma
- phyllodes tumor (benign)
- a single papilloma
- fat necrosis
- mastitis
- duct ectasia
- other benign tumors (lipoma, hamartoma, hemangioma, neurofibroma)

The *proliferative lesions without atypia* (those with excessive growth of cells in the ducts or lobules of the breast tissue) seem to raise a woman's risk of breast cancer slightly (1½ to 2 times normal). They include:

- usual ductal hyperplasia (without atypia)
- complex fibroadenoma
- sclerosing adenosis
- several papillomas or papillomatosis
- radial scar

The *proliferative lesions with atypia* (those with excessive growth of cells in the ducts or lobules of the breast tissue, and in which the cells no longer appear normal) have a stronger effect on breast cancer risk, raising it 4 to 5 times higher than normal. They include:

- atypical ductal hyperplasia (ADH)
- atypical lobular hyperplasia (ALH)

Women with a family history of breast cancer and either hyperplasia or atypical hyperplasia have an even higher risk of developing a breast cancer.

### Menstrual Periods

Women who started menstruating at an early age (before age 12) or who went through menopause at a late age (after age 55) have a slightly higher risk of breast cancer. This may be related to a higher lifetime exposure to the hormones estrogen and progesterone.

### Previous Chest Radiation

Women who, as children or young adults, had radiation therapy to the chest area as treatment for another cancer (such as Hodgkin disease or non-Hodgkin lymphoma) are at significantly increased risk for breast cancer. This varies with the age of the patient at the time of radiation. If chemotherapy was also given, the risk may be lowered if the chemotherapy stopped ovarian hormone production. The risk of developing breast cancer appears to be highest if the breast was still in development (during adolescence) when the radiation was given.

### Diethylstilbestrol (DES) Exposure

From the 1940s through the 1960s some pregnant women were given diethylstilbestrol because it was thought to lower their chances of losing the baby (miscarriage). Studies have shown that these women have a slightly increased risk of developing breast cancer. Recent findings have also suggested that women whose mothers took DES during pregnancy may have a higher risk for breast cancer. For more information on DES see the separate American Cancer Society document, [DES Exposure: Questions and Answers](#).

## Lifestyle-Related Factors and Breast Cancer Risk

### Not Having Children, or Having Them Later in Life

Women who have had no children or who had their first child after age 30 have a slightly higher breast cancer risk. Having multiple pregnancies and becoming pregnant at an early age reduces breast cancer risk.

### Oral Contraceptive Use

It is still not clear what part oral contraceptives (birth control pills) might play in breast cancer risk. Studies have suggested that women now using oral contraceptives have a slightly greater risk of breast cancer than women who have never used them, but this risk seems to decline once their use is stopped. Women who stopped using oral contraceptives more than 10 years ago do not appear to have any increased breast cancer risk. When thinking about using oral contraceptives, women should discuss their other risk factors for breast cancer with their health care team.

## Postmenopausal Hormone Therapy (PHT)

Postmenopausal hormone therapy, also known as hormone replacement therapy (HRT), has been used for many years to help relieve symptoms of menopause and to help prevent osteoporosis (thinning of the bones). Earlier studies suggested it might have other health benefits as well, but these have not been found in more recent, better designed studies.

There are 2 main types of PHT. For women who still have a uterus (womb), doctors generally prescribe estrogen and progesterone (known as combined PHT). Because estrogen alone can increase the risk of developing cancer of the uterus, progesterone is added to help prevent this. For women who no longer have a uterus (those who've had a hysterectomy), estrogen alone can be prescribed. This is commonly known as estrogen replacement therapy (ERT).

**Combined PHT:** It has become clear that long-term use (several years or more) of combined postmenopausal hormone therapy increases the risk of breast cancer and may also increase the chances of dying of breast cancer. Several large studies, including the Women's Health Initiative (WHI), have found that there is an increased risk of breast cancer related to the use of combined PHT. Combined PHT also increases the likelihood that the cancer may be found at a more advanced stage, possibly because it reduces the effectiveness of mammograms.

The increased risk from combined PHT appears to apply only to current and recent users. A woman's breast cancer risk seems to return to that of the general population within 5 years of stopping combined PHT.

**ERT:** The use of estrogen alone does not appear to increase the risk of developing breast cancer significantly, if at all. But when used long term (for more than 10 years), ERT has been found to increase the risk of ovarian and breast cancer in some studies.

At this time there appear to be few strong reasons to use postmenopausal hormone therapy (combined PHT or ERT), other than possibly for the short-term relief of menopausal symptoms. Along with the increased risk of breast cancer, combined PHT also appears to increase the risk of heart disease, blood clots, and strokes. It does lower the risk of colorectal cancer and osteoporosis, but this must be weighed against the possible harms, and it should be noted that there are other effective ways to prevent osteoporosis. While ERT does not seem to have much effect on the risk of breast cancer, it does increase the risk of stroke.

The decision to use PHT should be made by a woman and her doctor after weighing the possible risks and benefits (including the severity of her menopausal symptoms), and considering her other risk factors for heart disease, breast cancer, and osteoporosis.

## Breast-feeding

Some studies suggest that breast-feeding may slightly lower breast cancer risk, especially if breast-feeding is continued for 1.5 to 2 years. But this has been a difficult area to study, especially in countries such as the United States, where long-term breast-feeding is uncommon.

The explanation for this possible effect may be that breast-feeding reduces a woman's total number of lifetime menstrual cycles. This may be similar to the reduction of risk due to starting menstrual periods at a later age or due to early menopause, which also decrease the total number of menstrual cycles.

## Alcohol

Use of alcohol is clearly linked to an increased risk of developing breast cancer. The risk increases with the amount of alcohol consumed. Compared with nondrinkers, women who consume 1 alcoholic drink a day have a very small increase in risk. Those who have 2 to 5 drinks daily have about 1½ times the risk of women who drink no alcohol. Alcohol is also known to increase the risk of developing cancers of the mouth, throat, esophagus, and liver. The American Cancer Society recommends limiting your consumption of alcohol.

## Being Overweight or Obese

Being overweight or obese has been found to increase breast cancer risk, especially for women after menopause. Before menopause your ovaries produce most of your estrogen, and fat tissue produces a small amount of estrogen. After menopause, once the ovaries stop making estrogen, most of a woman's estrogen comes from fat tissue. Having more fat tissue after menopause can increase your estrogen levels and thereby increase your likelihood of developing breast cancer.

The connection between weight and breast cancer risk is complex, however. For example, the risk appears to be

increased for women who gained weight as an adult but may not be increased among those who have been overweight since childhood. Also, excess fat in the waist area may affect risk more than the same amount of fat in the hips and thighs. Researchers believe that fat cells in various parts of the body have subtle differences in their metabolism that may explain this observation.

The American Cancer Society recommends you maintain a healthy weight throughout your life by balancing your food intake with physical activity and avoiding excessive weight gain.

### Physical Activity

Evidence is growing that physical activity in the form of exercise reduces breast cancer risk. The only question is how much exercise is needed. In one study from the Women's Health Initiative (WHI) as little as 1.25 to 2.5 hours per week of brisk walking reduced a woman's risk by 18%. Walking 10 hours a week reduced the risk a little more.

To reduce your risk of breast cancer, the American Cancer Society recommends that you engage in 45 to 60 minutes of intentional physical activity 5 or more days a week.

## Factors With Uncertain, Controversial, or Unproven Effect on Breast Cancer Risk

### High-fat Diets

Studies of fat in the diet have not clearly shown that this is a breast cancer risk factor.

Most studies found that breast cancer is less common in countries where the typical diet is low in total fat, low in polyunsaturated fat, and low in saturated fat. On the other hand, many studies of women in the United States have not found breast cancer risk to be related to dietary fat intake. Researchers are still not sure how to explain this apparent disagreement. Many scientists note that studies comparing diet and breast cancer risk in different countries are complicated by other differences (such as activity level, intake of other nutrients, and genetic factors) that might also alter breast cancer risk.

More research is needed to better understand the effect of the types of fat eaten and body weight on breast cancer risk. But it is clear that calories do count, and fat is a major source of these. A diet high in fat has also been shown to influence the risk of developing several other types of cancer, and intake of certain types of fat is clearly related to heart disease risk.

The American Cancer Society recommends eating a healthy diet with an emphasis on plant sources. This includes eating 5 or more servings of vegetables and fruits each day, choosing whole grains over processed (refined) grains, and limiting consumption of processed and red meats.

### Antiperspirants

Internet e-mail rumors have suggested that chemicals in underarm antiperspirants are absorbed through the skin, interfere with lymph circulation, cause toxins to build up in the breast, and eventually lead to breast cancer. There is very little laboratory or population-based evidence to support this rumor.

One small study recently found trace levels of parabens (used as preservatives in antiperspirants and other products), which have weak estrogen-like properties, in a small sample of breast cancer tumors. However, the study did not look at whether parabens caused the tumors. This was a preliminary finding, and more research is needed to determine what effect, if any, parabens may have on breast cancer risk. On the other hand, a large study of breast cancer causes found no increase in breast cancer in women who used underarm antiperspirants or shaved their underarms.

### Bras

Internet e-mail rumors and at least one book have suggested that bras cause breast cancer by obstructing lymph flow. There is no good scientific or clinical basis for this claim. Women who do not wear bras regularly are more likely to be thinner, which would likely contribute to any perceived difference in risk.

### Induced Abortion

Several studies have provided very strong data that neither induced abortions nor spontaneous abortions (miscarriages) have an overall effect on the risk of breast cancer. For more detailed information, see the separate American Cancer Society document, ["Can Having an Abortion Cause or Contribute to Breast Cancer?"](#)

### Breast Implants

Several studies have found that breast implants do not increase breast cancer risk, although silicone breast implants can cause scar tissue to form in the breast. Implants make it harder to see breast tissue on standard mammograms, but additional x-ray pictures called implant displacement views can be used to more completely examine the breast tissue.

### **Environmental Pollution**

A great deal of research has been reported and more is being done to understand environmental influences on breast cancer risk. The goal is to determine their possible relationships to breast cancer. Of special interest are compounds in the environment that have estrogen-like properties, which could in theory affect breast cancer risk. While this issue understandably invokes a great deal of public concern, at this time research does not show a clear link between breast cancer risk and exposure to environmental pollutants, such as the pesticide DDE (chemically related to DDT) and PCBs (polychlorinated biphenyls).

### **Tobacco Smoke**

Most studies have found no link between cigarette smoking and breast cancer. Though active smoking has been suggested to increase the risk of breast cancer in some studies, the issue remains controversial.

An issue that continues to be an active focus of scientific research is whether secondhand smoke may increase the risk of breast cancer. Both mainstream and secondhand smoke contain chemicals that, in high concentrations, cause breast cancer in rodents. Chemicals in tobacco smoke reach breast tissue and are found in breast milk.

The evidence regarding secondhand smoke and breast cancer risk in human studies is controversial, at least in part because the risk has not been shown to be increased in smokers. One possible explanation for this is that tobacco smoke may have different effects on breast cancer risk in smokers and in those who are just exposed to smoke.

A report from the California Environmental Protection Agency in 2005 concluded that the evidence regarding secondhand smoke and breast cancer is "consistent with a causal association" in younger, mainly premenopausal women. The 2006 US Surgeon General's report, *The Health Consequences of Involuntary Exposure to Tobacco Smoke*, concluded that there is "suggestive but not sufficient" evidence of a link at this point. In any case, this possible link to breast cancer is yet another reason to avoid contact with secondhand smoke.

### **Night Work**

Several studies have suggested that women who work at night -- for example, nurses on a night shift -- may have an increased risk of developing breast cancer. This is a fairly recent finding, and more studies are in progress to look at this issue. According to some researchers, the effect may be due to disruption in melatonin, a hormone that is affected by light, but other hormones are also being studied.

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