Breast Cancer Risk and Prevention

Risk Factors for Breast Cancer

A risk factor is anything that affects your chance of getting a disease, such as cancer. But having a risk factor, or even many, does not mean that you are sure to get the disease. While you can't change some breast cancer risk factors—family history and aging, for example—there are some risk factors that you can control.

- Lifestyle-related Breast Cancer Risk Factors
- Breast Cancer Risk Factors You Cannot Change
- Factors with Unclear Effects on Breast Cancer Risk
- Disproven or Controversial Breast Cancer Risk Factors

Can Breast Cancer Be Prevented?

There is no sure way to prevent breast cancer. But there are things you can do that might lower your risk. This can be especially helpful for women with certain risk factors for breast cancer, such as having a strong family history or certain gene changes.

- Can I Lower My Risk of Breast Cancer?
- Deciding Whether to Use Medicine to Reduce Breast Cancer Risk
- Tamoxifen and Raloxifene for Lowering Breast Cancer Risk
- Aromatase Inhibitors for Lowering Breast Cancer Risk
- Preventive Surgery to Reduce Breast Cancer Risk

Breast Cancer Risk Factors You Cannot Change

A risk factor is anything that affects your chance of getting a disease, such as breast

cancer. But having a risk factor, or even many, does not mean that you are sure to get the disease.

Some risk factors for breast cancer are things you cannot change, such as being a woman, getting older, and having certain gene changes. These make your risk of breast cancer higher.

Being a woman

Simply being a woman is the main risk factor for breast cancer. Men can get breast cancer, too, but this disease is about 100 times more common in women than in men.

Getting older

As you get older, your risk of breast cancer goes up. Most breast cancers are found in women age 55 and older.

Certain inherited genes

About 5% to 10% of breast cancer cases are thought to be hereditary, meaning that they result directly from gene defects (called *mutations*) passed on from a parent.

BRCA1 and BRCA2: The most common cause of hereditary breast cancer is an inherited mutation in the *BRCA1* or *BRCA2* gene. In normal cells, these genes help make proteins that repair damaged DNA. Mutated versions of these genes can lead to abnormal cell growth, which can lead to cancer.

- If you have inherited a mutated copy of either gene from a parent, you have a higher risk of breast cancer.
- On average, a woman with a *BRCA1* or *BRCA2* gene mutation has about a 7 in 10 chance of getting breast cancer by age 80. This risk is also affected by how many other family members have had breast cancer. (It goes up if more family members are affected.)
- Women with one of these mutations are more likely to be diagnosed with breast cancer at a younger age, as well as to have cancer in both breasts. They also have a higher risk of developing some other cancers, mainly ovarian cancer.
- In the United States, *BRCA* mutations are more common in Jewish people of Ashkenazi (Eastern Europe) origin than in other racial and ethnic groups, but

anyone can have them.

Changes in other genes: Other gene mutations can also lead to inherited breast cancers. These gene mutations are much less common, and most of them do not increase the risk of breast cancer as much as the *BRCA* genes.

- ***ATM:*** The *ATM* gene normally helps repair damaged DNA (or helps kill the cell if the damaged can't be fixed). Inheriting 2 abnormal copies of this gene causes the disease *ataxia-telangiectasia*. Inheriting one abnormal copy of this gene has been linked to a high rate of breast cancer in some families.
- ***TP53:*** The *TP53* gene gives instructions for making a protein called *p53* that helps stop the growth of abnormal cells. Inherited mutations of this gene cause *Li-Fraumeni syndrome*. People with this syndrome have an increased risk of breast cancer, as well as some other cancers such as leukemia, brain tumors, and sarcomas (cancers of bones or connective tissue). This mutation is a rare cause of breast cancer.
- ***CHEK2:*** The *CHEK2* gene is another gene that normally helps with DNA repair. A *CHEK2* mutation can increase breast cancer risk about 2-fold.
- ***PTEN:*** The *PTEN* gene normally helps regulate cell growth. Inherited mutations in this gene can cause *Cowden syndrome*, a rare disorder that puts people at higher risk for both non-cancer and cancer tumors in the breasts, as well as growths in the digestive tract, thyroid, uterus, and ovaries.
- ***CDH1:*** Inherited mutations in this gene cause *hereditary diffuse gastric cancer*, a syndrome in which people develop a rare type of stomach cancer. Women with mutations in this gene also have an increased risk of invasive lobular breast cancer.
- ***STK11:*** Defects in this gene can lead to *Peutz-Jeghers syndrome*. People affected with this disorder have pigmented spots on their lips and in their mouths, polyps (abnormal growths) in the urinary and digestive tracts, and a higher risk of many types of cancer, including breast cancer.
- ***PALB2:*** The *PALB2* gene makes a protein that interacts with the protein made by the *BRCA2* gene. Mutations in this gene can lead to a higher risk of breast cancer.

Mutations in several other genes have also been linked to breast cancer, but these account for only a small number of cases.

Genetic testing: Genetic testing can be done to look for mutations in the *BRCA1* and *BRCA2* genes (or less commonly in other genes such as *PTEN* or *TP53*). While testing can be helpful in some cases, not every woman needs to be tested, and the pros and cons need to be considered carefully.

One concern is that some genetic tests are promoted to doctors and the public without

giving full information. For example, a test for a small number of BRCA1 and BRCA2 gene mutations has been approved by the FDA. However, there are more than 1,000 known BRCA mutations, and the ones included in the approved test are not the most common ones. This means there are many BRCA mutations that would not be detected by this test.

If you're thinking about genetic testing, it's strongly recommended that you first talk to a genetic counselor, nurse, or doctor who can explain these tests. It's very important to understand what genetic testing can and can't tell you, and to carefully weigh the benefits and risks of genetic testing before these tests are done. Testing costs a lot and might not be covered by some health insurance plans.

Our section on genetics and cancer has more information about genetic mutations and testing for them.

Having a family history of breast cancer

It's important to note that most women (about 8 out of 10) who get breast cancer *do not* have a family history of the disease. But women who have close blood relatives with breast cancer have a higher risk:

- Having a first-degree relative (mother, sister, or daughter) with breast cancer almost doubles a woman's risk. Having 2 first-degree relatives increases her risk about 3-fold.
- Women with a father or brother who have had breast cancer also have a higher risk of breast cancer.

Overall, less than 15% of women with breast cancer have a family member with this disease.

Having a personal history of breast cancer

A woman with cancer in one breast has a higher risk of developing a new cancer in the other breast or in another part of the same breast. (This is different from a recurrence or return of the first cancer.) Although this risk is low overall, it's even higher for younger women with breast cancer.

Your race and ethnicity

Overall, white women are slightly more likely to develop breast cancer than African-American women. But in women under age 45, breast cancer is more common in African-American women. African-American women are also more likely to die from breast cancer at any age. Asian, Hispanic, and Native American women have a lower risk of developing and dying from breast cancer.

Having dense breast tissue

Breasts are made up of fatty tissue, fibrous tissue, and glandular tissue. Someone is said to have dense breasts (on a mammogram) when they have more glandular and fibrous tissue and less fatty tissue. Women with dense breasts on mammogram have a risk of breast cancer that is about 1.5 to 2 times that of women with average breast density. Unfortunately, dense breast tissue can also make it harder to see cancers on mammograms.

A number of factors can affect breast density, such as age, menopausal status, the use of certain drugs (including menopausal hormone therapy), pregnancy, and genetics.

For more information, see our information on breast density and mammograms.

Certain benign breast conditions

Women diagnosed with certain benign (non-cancer) breast conditions may have a higher risk of breast cancer. Some of these conditions are more closely linked to breast cancer risk than others. Doctors often divide benign breast conditions into 3 groups, depending on how they affect this risk.

Non-proliferative lesions: These conditions don't seem to affect breast cancer risk, or if they do, the increase in risk is very small. They include:

- Fibrosis and/or simple cysts (sometimes called *fibrocystic changes* or *disease*)
- Mild hyperplasia
- Adenosis (non-sclerosing)
- Phyllodes tumor (benign)
- A single papilloma
- Fat necrosis
- Duct ectasia
- Periductal fibrosis
- Squamous and apocrine metaplasia

- Epithelial-related calcifications
- Other tumors (lipoma, hamartoma, hemangioma, neurofibroma, adenomyoepithelioma)

Mastitis (infection of the breast) is not a tumor and does not increase the risk of breast cancer.

Proliferative lesions without atypia (cell abnormalities): In these conditions there's excessive growth of cells in the ducts or lobules of the breast, but the cells don't look very abnormal. These conditions seem to raise a woman's risk of breast cancer slightly. They include:

- Usual ductal hyperplasia (without atypia)
- Fibroadenoma
- Sclerosing adenosis
- Several papillomas (called *papillomatosis*)
- Radial scar

Proliferative lesions with atypia: In these conditions, the cells in the ducts or lobules of the breast tissue grow excessively, and some of them no longer look normal. These types of lesions include:

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

Breast cancer risk is about 4 to 5 times higher than normal in women with these changes. If a woman also has a family history of breast cancer and either hyperplasia or atypical hyperplasia, she has an even higher risk of breast cancer.

For more information, see Non-cancerous Breast Conditions.

Lobular carcinoma in situ (LCIS)

In LCIS, cells that look like cancer cells are growing in the lobules of the milk-producing glands of the breast, but they are not growing through the wall of the lobules. LCIS is also called *lobular neoplasia*. It's sometimes grouped with ductal carcinoma in situ (DCIS) as a non-invasive breast cancer, but it differs from DCIS in that it doesn't seem to become invasive cancer if it isn't treated.

Women with LCIS have a much higher risk of developing cancer in either breast.

Starting menstruation (periods) early

Women who have had more menstrual cycles because they started menstruating early (especially before age 12) have a slightly higher risk of breast cancer. The increase in risk may be due to a longer lifetime exposure to the hormones estrogen and progesterone.

Going through menopause after age 55

Women who have had more menstrual cycles because they went through menopause later (after age 55) have a slightly higher risk of breast cancer. The increase in risk may be because they have a longer lifetime exposure to the hormones estrogen and progesterone.

Having radiation to your chest

Women who were treated with radiation therapy to the chest for another cancer (such as Hodgkin disease or non-Hodgkin lymphoma) when they were younger have a significantly higher risk for breast cancer. This varies with the patient's age when they got radiation. The risk is highest if you had radiation as a teen or young adult, when your breasts were still developing. Radiation treatment after age 40 does not seem to increase breast cancer risk.

Exposure to diethylstilbestrol (DES)

From the 1940s through the early 1970s some pregnant women were given an estrogen-like drug called *DES* because it was thought to lower their chances of losing the baby (miscarriage). These women have a slightly increased risk of developing breast cancer. Women whose mothers took DES during pregnancy may also have a slightly higher risk of breast cancer.

To learn more, see our information about DES exposure.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Lifestyle-related Breast Cancer Risk Factors

A risk factor is anything that affects your chance of getting a disease, such as breast cancer. But having a risk factor, or even many, does not mean that you are sure to get the disease.

Certain breast cancer risk factors are related to personal behaviors, such as diet and exercise. Other lifestyle-related risk factors include decisions about having children and taking medicines that contain hormones.

Drinking alcohol

Drinking alcohol is clearly linked to an increased risk of breast cancer. The risk increases with the amount of alcohol consumed. Compared with non-drinkers, women who have 1 alcoholic drink a day have a very small increase in risk. Those who have 2 to 3 drinks a day have about a 20% higher risk compared to women who don't drink alcohol. Excessive alcohol consumption is known to increase the risk of other cancers, too.

The American Cancer Society recommends that women who drink have no more than 1 drink a day.

Being overweight or obese

Being overweight or obese after menopause increases breast cancer risk. Before menopause your ovaries make most of your estrogen, and fat tissue makes only a small amount. After menopause (when the ovaries stop making estrogen), most of a woman's estrogen comes from fat tissue. Having more fat tissue after menopause can raise estrogen levels and increase your chance of getting breast cancer. Also, women who are overweight tend to have higher blood insulin levels. Higher insulin levels have been linked to some cancers, including breast cancer.

Still, the link between weight and breast cancer risk is complex. For instance, 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 that may explain this.

Weight might also have different effects on different types of breast cancer. For example, some research suggests that being overweight before menopause might increase your risk of triple-negative breast cancer.

The American Cancer Society recommends you stay at a healthy weight throughout your life and avoid excess weight gain by balancing your food intake with physical activity.

Not being physically active

Evidence is growing that regular physical activity reduces breast cancer risk, especially in women past menopause. The main question is how much activity is needed. Some studies have found that even as little as a couple of hours a week might be helpful ,

although more seems to be better.

Exactly how physical activity might reduce breast cancer risk isn't clear, but it may be due to its effects on body weight, inflammation, hormones, and energy balance.

The American Cancer Society recommends that adults get at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity activity each week (or a combination of these), preferably spread throughout the week.

Not having children

Women who have not had children or who had their first child after age 30 have a slightly higher breast cancer risk overall. Having many pregnancies and becoming pregnant at an early age reduces breast cancer risk. Still, the effect of pregnancy seems to be different for different types of breast cancer. For a certain type of breast cancer known as triple-negative, pregnancy seems to increase risk.

Not breastfeeding

Some studies suggest that breastfeeding may slightly lower breast cancer risk, especially if it's continued for 1½ to 2 years. But this has been hard to study, especially in countries like the United States, where breastfeeding for this long is uncommon.

The explanation for this possible effect may be that breastfeeding reduces a woman's total number of lifetime menstrual cycles (the same as starting menstrual periods at a later age or going through early menopause).

Birth control

Some birth control methods use hormones, which might increase breast cancer risk.

Oral contraceptives: Most studies have found that women using oral contraceptives (birth control pills) have a slightly higher risk of breast cancer than women who have never used them. Once the pills are stopped, this risk seems to go back to normal over time. Women who stopped using oral contraceptives more than 10 years ago do not appear to have any increased breast cancer risk.

Birth control shot:Depo-Provera is an injectable form of progesterone that's given once every 3 months for birth control. Some studies have found that women currently

using birth-control shots seem to have an increase in breast cancer risk, but it appears that there is no increased risk in women 5 years after they stop getting the shots.

Birth control implants, intrauterine devices (IUDs), skin patches, vaginal rings: These forms of birth control also use hormones, which in theory could fuel breast cancer growth. Some studies have shown a link between use of hormone-releasing IUDs and breast cancer risk, but few studies have looked at the use of birth control implants, patches, and rings and breast cancer risk.

When thinking about using hormonal birth control, women should discuss their other risk factors for breast cancer with their health care provider.

Hormone therapy after menopause

Hormone therapy with estrogen (often combined with progesterone) has been used for many years to help relieve symptoms of menopause and help prevent osteoporosis (thinning of the bones). This treatment goes by many names, such as *post-menopausal hormone therapy* (PHT), *hormone replacement therapy* (HRT), and *menopausal hormone therapy* (MHT).

There are 2 main types of hormone therapy. For women who still have a uterus (womb), doctors generally prescribe estrogen and progesterone (known as *combined hormone therapy* or HT). Progesterone is needed because estrogen alone can increase the risk of cancer of the uterus. For women who've had a hysterectomy (who no longer have a uterus), estrogen alone can be used. This is known as *estrogen replacement therapy* (ERT) or just *estrogen therapy (ET)*.

Combined hormone therapy (HT): Use of combined hormone therapy after menopause increases the risk of breast cancer. It may also increase the chances of dying from breast cancer. This increase in risk can be seen with as little as 2 years of use. Combined HT also increases the likelihood that the cancer may be found at a more advanced stage.

The increased risk from combined HT 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 treatment.

Bioidentical hormone therapy: The word *bioidentical* is sometimes used to describe versions of estrogen and progesterone with the same chemical structure as those found naturally in people. The use of these hormones has been marketed as a safe way to treat the symptoms of menopause. But because there aren't many studies comparing

“bioidentical” or “natural” hormones to synthetic versions of hormones, there’s no proof that they’re safer or more effective. More studies are needed to know for sure. The use of these bioidentical hormones should be considered to have the same health risks as any other type of hormone therapy.

Estrogen therapy (ET): The use of estrogen alone after menopause does not seem to increase the risk of breast cancer much, if at all. But when used long term (for more than 15 years), ET has been found to increase the risk of ovarian and breast cancer in some studies.

At this time there aren't many strong reasons to use post-menopausal hormone therapy (either combined HT or ET), other than possibly for the short-term relief of menopausal symptoms. Along with the increased risk of breast cancer, combined HT 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, especially since there are other ways to prevent and treat osteoporosis, and screening can sometimes prevent colon cancer. ET does not seem to increase breast cancer risk, but it does increase the risk of stroke.

The decision to use HT 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. If they decide she should try HT for symptoms of menopause, it’s usually best to use it at the lowest dose that works for her and for as short a time as possible.

Breast implants

Silicone breast implants can cause scar tissue to form in the breast. Implants make breast tissue harder to see on standard mammograms, but additional x-ray pictures called *implant displacement views* can be used to examine the breast tissue more completely.

Certain types of breast implants can be linked to a rare type of cancer called anaplastic large cell lymphoma (ALCL). It' is sometimes referred to as breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). This lymphoma appears to happen more often in implants with textured (rough) surfaces rather than smooth surfaces. If ALCL does show up after an implant, it can show up as a lump, a collection of fluid near the implant, pain, swelling or asymmetry (uneven breasts). It usually responds well to treatment.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Factors with Unclear Effects on Breast Cancer Risk

There are some things that might be risk factors for breast cancer, but the research is not yet clear about whether they really affect breast cancer risk. They include things like tobacco smoke and working at night.

Diet and vitamins

While being overweight or obese and not being physically active have been linked to breast cancer risk, the possible link between diet and breast cancer risk is less clear. Results of some studies have shown that diet may play a role, while others have not found that diet influences breast cancer risk.

Most studies of women in the United States have not found a link between breast cancer risk and fat in the diet. Still, studies have 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. Researchers are still not sure how to explain this. It may be at least partly due to the effect of diet on body weight. Also, 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 affect breast

cancer risk.

We do know that high-fat diets can lead to being overweight or obese, which is a known breast cancer risk factor. A diet high in fat is also a risk factor for some other types of cancer. And intake of certain types of fat is clearly related to higher risk of heart disease.

Studies looking at vitamin levels have had inconsistent results. So far, no study has shown that taking vitamins reduces the risk of breast cancer (or any other cancer). But this does not mean that there's no point in eating a healthy diet. A diet low in fat, low in red meat and processed meat, and high in fruits and vegetables can clearly have other health benefits, including lowering the risk of some other cancers.

Chemicals in the environment

A great deal of research has been reported and more is being done to understand possible environmental influences on breast cancer risk.

Compounds in the environment that have estrogen-like properties are of special interest. For example, substances found in some plastics, certain cosmetics and personal care products, pesticides, and PCBs (polychlorinated biphenyls) seem to have such properties. In theory, these could affect breast cancer risk.

This issue causes a great deal of public concern, but at this time research does not show a clear link between breast cancer risk and exposure to these substances. Studying such effects in humans is hard to do. More research is needed to better define the possible health effects of these substances and others like them.

Tobacco smoke

For a long time, studies showed no link between cigarette smoking and breast cancer. But in recent years, more studies have shown that heavy smoking over a long time might be linked to a higher risk of breast cancer. In some studies, the risk has been highest in certain groups, such as women who started smoking before they had their first child. The 2014 US Surgeon General's report on smoking concluded that there is "suggestive but not sufficient" evidence that smoking increases the risk of breast cancer.

Researchers are also looking at whether secondhand smoke increases the risk of breast cancer. Both mainstream and secondhand smoke contain chemicals that, in high

concentrations, cause breast cancer in rodents. Studies have shown that chemicals in tobacco smoke reach breast tissue and are found in breast milk of rodents. In human studies, the evidence on secondhand smoke and breast cancer risk is not clear. Most studies have not found a link, but some studies have suggested it may increase risk, particularly in premenopausal women. The 2014 US Surgeon General's report 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 secondhand smoke.

Night shift work

Some studies have suggested that women who work at night, such as nurses on a night shift, might have an increased risk of breast cancer. This is a fairly recent finding, and more studies are looking at this. Some researchers think the effect may be due to changes in levels of melatonin, a hormone that's affected by the body's exposure to light, but other hormones are also being studied.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Disproven or Controversial Breast Cancer Risk Factors

There are many factors that research has shown are not linked to breast cancer. You may see information online or hear about these disproven or controversial risk factors, but it's important to learn the facts.

Antiperspirants

Internet and e-mail rumors have suggested that chemicals in underarm antiperspirants are absorbed through the skin, interfere with lymph circulation, and cause toxins to build up in the breast, eventually leading to breast cancer.

Based on the available evidence (including what we know about how the body works), there is little if any reason to believe that antiperspirants increase the risk of breast cancer. For more information, see Antiperspirants and Breast Cancer Risk.

Bras

Internet and 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, and a 2014 study of more than 1,500 women found no association between wearing a bra and breast cancer 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 Abortion and Breast Cancer Risk.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Can I Lower My Risk of Breast Cancer?

There is no sure way to prevent breast cancer. But there are things you can do that might lower your risk. Many risk factors are beyond your control, such as being female and getting older. But other risk factors can be changed and may lower your risk.

For women who are known to be at increased risk for breast cancer, there are additional steps that might reduce the risk of developing breast cancer.

For all women

Get to and stay at a healthy weight: Both increased body weight and weight gain as an adult are linked with a higher risk of breast cancer after menopause. The American Cancer Society recommends you stay at a healthy weight throughout your life and avoid excess weight gain by balancing your food intake with physical activity.

Be physically active: Many studies have shown that moderate to vigorous physical activity is linked with lower breast cancer risk, so it's important to get regular physical activity. The American Cancer Society recommends that adults get at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity activity each week (or a combination of these), preferably spread throughout the week.

Moderate activity is anything that makes you breathe as hard as you do during a brisk walk. It causes a slight increase in heart rate and breathing. You should be able to talk, but not sing during the activity. **Vigorous activities** are performed at a higher intensity. They cause an increased heart rate, sweating, and a faster breathing rate. Activities that improve strength and flexibility, such as weight lifting, stretching, or yoga, are also beneficial.

Limit or avoid alcohol: Alcohol also increases risk of breast cancer. Even low levels of alcohol intake have been linked with an increase in risk. The American Cancer Society recommends that women who drink have no more than 1 alcoholic drink a day. A drink is 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of 80-proof distilled spirits (hard liquor).

Is there a link between diet/vitamins and breast cancer risk? The possible link between diet and breast cancer risk is not clear, but this is an active area of study. A diet that is rich in vegetables, fruit,

poultry, fish, and low-fat dairy products has been linked with a lower risk of breast cancer in some studies. But it is not clear if specific vegetables, fruits, or other foods can lower risk. And most studies have not found that lowering fat intake has much of an effect on breast cancer risk.

But this does not mean that there's no point in eating a healthy diet. A diet low in fat, low in processed and red meat, and high in fruits and vegetables can clearly have other health benefits, including lowering the risk of some other cancers.

So far, no study has shown that taking vitamins or other supplements reduces the risk of breast cancer (or any other cancer).

For more on the links between body weight, physical activity, diet, and breast cancer (as well as other cancers), see American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention.

Other factors that might lower risk: Women who choose to breastfeed for at least several months may also get an added benefit of reducing their breast cancer risk.

Using hormone therapy after menopause can *increase* your risk of breast cancer. To avoid this, talk to your health care provider about non-hormonal options to treat menopausal symptoms.

For women at increased risk of breast cancer

If you are a woman at increased risk for breast cancer (for instance, because you have a strong family history of breast cancer, a known gene mutation that increases breast cancer risk, such as in the BRCA1 or BRCA2 gene, or you have had DCISor LCIS), there are some things you can do to help lower your chances of developing breast cancer.

Your health care provider can help you determine your risk of breast cancer, as well as which, if any, of these options might be right for you.

Medicines to lower breast cancer risk

Prescription medicines can be used to help lower breast cancer risk in certain women at increased risk of breast cancer. (This risk is usually determined with a risk assessment

tool known as the **Gail Model.**)

Medicines such as tamoxifen and raloxifene block the action of estrogen in breast tissue. Tamoxifen can be taken even if you haven't gone through menopause, while raloxifene is only used for women who have gone through menopause. Other drugs, called *aromatase inhibitors*, might also be an option for women past menopause. All of these medicines can also have side effects, so it's important to understand the possible benefits and risks of taking one of them.

To learn more, see:

- Deciding Whether to Use Medicine to Reduce Breast Cancer Risk
- Tamoxifen and Raloxifene for Lowering Breast Cancer Risk
- Aromatase Inhibitors for Lowering Breast Cancer Risk

Preventive surgery for women with very high breast cancer risk

For the small fraction of women who have a very high risk for breast cancer, surgery to remove the breasts may be an option. Another option might be to remove the ovaries, which are the main source of estrogen in the body. While surgery can lower the risk of breast cancer, it can't eliminate it completely, and it can come with its own side effects. For more on this topic, see Preventive Surgery to Reduce Breast Cancer Risk.

Before deciding which, if any, of these options might be right for you, talk with your health care provider to understand your risk of breast cancer and how much any of these approaches might lower this risk.

For women at increased breast cancer risk who don't want to take medicines or have surgery, another option is to have more frequent doctor visits and tests to look for breast cancer. This is sometimes referred to as **close observation.** While this approach doesn't lower breast cancer risk, it might help find it early, when it's likely to be easier to treat.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Deciding Whether to Use Medicine to Reduce Breast Cancer Risk

For women with a higher than average risk of breast cancer, some medicines can help reduce this risk. But these drugs can also have side effects, so it's important to weigh their pros and cons before deciding whether to take one.

Should I take a drug to help reduce my breast cancer risk?

Taking medicines to help lower the risk of getting a disease is called *chemoprevention*. The most commonly used medicines to lower breast cancer risk are tamoxifen and raloxifene. Other medicines called aromatase inhibitors (such as anastrozole and exemestane) might also be options.

The first step in deciding if you should take a drug to help lower your chances of getting breast cancer is to have a health care provider assess your breast cancer risk. (See below for names of tools that can be used to do this.)

For now, most experts say that your breast cancer risk should be higher than average for you to consider taking one of these drugs. If you do have a higher than average risk, you need to compare the benefit of possibly reducing your chance of getting breast cancer with the risk of side effects and other problems from taking one of these drugs.

Your risk factors need to be identified to find out if you are at higher than average risk for breast cancer. A risk factor is anything that affects your risk of getting a disease. But keep in mind that having risk factors that are linked to a higher risk does not mean that you will definitely develop breast cancer. In fact, most women who have one or more risk factors will never develop breast cancer.

Some important risk factors for breast cancer include:

- Being a woman
- Getting older
- Having blood relatives who had breast cancer
- Your menstrual history

- Your pregnancy history
- Having had invasive breast cancer or ductal carcinoma in situ (DCIS) in the past
- Being diagnosed with lobular carcinoma in situ (LCIS)
- Being diagnosed with atypical ductal hyperplasia (ADH) or atypical lobular hyperplasia (ALH)
- Having a gene mutation linked to a family cancer syndrome (such as a *BRCA* mutation)

How is breast cancer risk assessed?

Researchers have built some statistical models to help predict a woman's risk of getting breast cancer.

The **Breast Cancer Risk Assessment Tool** (also called the **Gail Model**) is commonly used to assess this risk. It can estimate your risk of getting breast cancer in the next 5 years and over your lifetime, based on many of the factors listed above.

The tool does have some limits, though. For instance, it only looks at family history in close relatives (like siblings, parents, and children). And it doesn't estimate risk if you have a history of ductal carcinoma in situ (DCIS), lobular carcinoma in situ (LCIS), or have had breast cancer. It's also not helpful if you have a family cancer syndrome.

Also, the data that this tool is based on didn't include Hispanic/Latina, American Indian, or Alaskan Native women, so estimates for these women may not be accurate.

Other risk assessment tools, such as the Tyrer-Cuzick model and the Claus model, are based largely on family history.

These tools can give you a rough estimate of your risk, but no tool or test can tell for sure if you'll develop breast cancer.

How high does my risk need to be?

There is no single definition of a higher than average risk of breast cancer. But most major studies have used a 1.7% risk of developing breast cancer over the next 5 years as their cut-off point. (1.7% is average risk of a 60-year-old woman.)

Some medical organizations recommend that doctors discuss the use of medicines to lower breast cancer risk in women at least 35 years old who have a 5-year risk of 1.7%

or higher. Others might use different cutoff points.

The American Cancer Society does not have recommendations for the use of medicines to help lower the risk of breast cancer.

Are there reasons not to take one of these drugs to help reduce breast cancer risk?

All drugs have risks and side effects that must be discussed when making the decision about chemoprevention.

Most experts agree that neither **tamoxifen nor raloxifene** should be used to reduce breast cancer risk in women who:

- Have a higher risk of serious blood clots*
- Are pregnant or planning to become pregnant
- Are breastfeeding
- Are taking estrogen (including birth control pills or shots, or menopausal hormone therapy)
- Are taking an aromatase inhibitor
- Are younger than 35 years old

*Women who have a higher risk of serious blood clots include those who have *ever* had serious blood clots (deep venous thrombosis [DVT] or pulmonary embolism [PE]). Many doctors also feel that if you've had a stroke or heart attack you also have a higher risk of blood clots if you take these drugs. If you smoke, are obese, or have (or are being treated for) high blood pressure or diabetes you also have a higher risk of serious blood clots. Women with these conditions should talk to their doctors to see if the benefits of chemoprevention outweigh the risks.

A woman who has been diagnosed with any type of uterine cancer or atypical hyperplasia of the uterus (a kind of pre-cancer) should not take tamoxifen to help lower breast cancer risk.

Raloxifene has not been tested in pre-menopausal women, and should only be used if you have gone through menopause.

Aromatase inhibitors are not useful for pre-menopausal women, and should only be used if you have gone through menopause. These drugs can cause bone thinning (osteoporosis), so they're not likely to be a good option in women who already have thin or weakened bones.

Talk with your doctor about your total health picture to make the best possible choice for you.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Tamoxifen and Raloxifene for Lowering Breast Cancer Risk

Tamoxifen and raloxifene have been shown to reduce the risk breast cancer, but they can have their own risks and side effects. Tamoxifen and raloxifene are the only drugs that are approved in the US to help lower the risk of breast cancer, although for some

women, drugs called aromatase inhibitors might be an option as well.

What kind of drugs are tamoxifen and raloxifene?

Both of these drugs are *selective estrogen receptor modulators* (SERMs). This means that they act against (or block) estrogen (a female hormone) in some tissues of the body, but act like estrogen in others. Estrogen can fuel the growth of breast cancer cells. Both of these drugs block estrogen in breast cells, which is why they can be useful in lowering breast cancer risk.

These drugs are used more often for other things.

- Tamoxifen is used mainly to treat hormone receptor-positive breast cancer (breast cancer with cells that have estrogen and/or progesterone receptors on them).
- Raloxifene is used mostly to prevent and treat osteoporosis (very weak bones) in post-menopausal women.

To lower the risk of breast cancer, these drugs are taken for 5 years. Both drugs are pills taken once a day. Tamoxifen also comes in a liquid form. Tamoxifen can be taken whether or not you have gone through menopause, but raloxifene is only approved for post-menopausal women.

How much do these drugs lower the risk of breast cancer?

The effect of these drugs on breast cancer risk has varied in different studies. When the results of all the studies are taken together, the overall reduction in risk for these drugs is about 40% (more than a third). These drugs lower the risk of both invasive breast cancer and ductal carcinoma in situ (DCIS).

What would this mean for me?

Although a medicine that cuts your risk by about 40% sounds like it must be a good thing, what it would really mean for you depends on how high your risk is in the first place (your baseline risk).

For example, if you had an 8% risk of getting breast cancer in the next 5 years, you would be considered to be at increased risk. An 8% risk would mean that over the next 5 years, 8 of 100 women with your risk would be expected to get breast cancer. A 40%

reduction in your risk would mean your risk goes down to 5%. This would be only a 3% change overall.

Since the change in your overall risk depends on your baseline risk, you would benefit less if you had a lower baseline risk, and you would benefit more if your risk was higher. If you had a baseline risk of only 1.7% in the next 5 years (which is what many organizations use as a cutoff point for being at 'increased risk'), the 40% change would mean that your risk would go down to about 1% in the next 5 years. This means your overall risk in the next 5 years would go down by less than 1%.

Your doctor can estimate your breast cancer risk based on factors like your age, medical history, and family history. This can help you see how much benefit you might get from taking one of these drugs.

Are there other benefits to taking these drugs?

Both tamoxifen and raloxifene can **help prevent osteoporosis**, a severe weakening of the bones that is more common after menopause.

What are the main risks and side effects of taking these drugs?

Menopausal symptoms

The most common side effects of these drugs are symptoms of menopause. These include hot flashes and night sweats. Tamoxifen can also cause vaginal dryness and vaginal discharge. Pre-menopausal women taking tamoxifen can experience menstrual changes. Menstrual periods can become irregular or even stop. Although periods often start again after the drug is stopped, they don’t always, and some women go into menopause. This is more likely in women who were close to menopause when they started taking the drug.

Other more serious side effects are rare. These include serious blood clots and cancer of the uterus.

Blood clots

Both tamoxifen and raloxifene increase your risk of developing blood clotsin a vein in your leg (deep venous thrombosis) or in your lungs (pulmonary embolism). These clots

can sometimes cause serious problems, and even death. In the major studies looking at these drugs for breast cancer prevention, the overall risk of these blood clots over 5 years of treatment was less than 1%. This risk could be higher if you had a serious blood clot in the past, so these drugs are geenrally not recommended to lower breast cancer risk for anyone with a history of blood clots.

Because these drugs increase your risk of developing serious blood clots, there is also concern that they might also increase your risk of heart attack or stroke, although this is not clear. This is something you might want to discuss with your doctor, especially if you have a history of a heart attack or stroke, or if you are at increased risk for them (see Deciding Whether to Use Medicine to Reduce Breast Cancer Risk).

Cancer of the uterus

Because tamoxifen acts like estrogen in the uterus, it can increase your risk of endometrial cancer and uterine sarcoma (cancers of the uterus). It also is linked to a higher risk of endometrial pre-cancers. Raloxifene does not act like estrogen in the uterus and is not linked to an increased risk of uterine cancer.

Although tamoxifen does increase the risk of uterine cancer, the overall increase in risk is low (less than 1%). The risk of uterine cancer goes back to normal within a few years of stopping the drug.

The increased risk seems to affect women over 50, but not younger women.

If you have been diagnosed with uterine cancer or pre-cancer you should not take tamoxifen.

If you have had a hysterectomy (surgery to remove the uterus), you are not at risk for endometrial cancer or uterine sarcoma and do not have to worry about these cancers.

If you are taking tamoxifen, tell your doctor if you have any abnormal vaginal bleeding or spotting, especially after menopause, as these are possible symptoms of uterine cancer.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

Aromatase Inhibitors for Lowering Breast Cancer Risk

Aromatase inhibitors (AIs) may someday prove to be as good as or even better than tamoxifen or raloxifene in reducing breast cancer risk, but they haven't been studied as much for this use. More research is needed to see how effective they are, who would most benefit from them, and how long treatment should be continued.

What are aromatase inhibitors?

Aromatase inhibitors lower estrogen levels by stopping an enzyme in fat tissue

(called *aromatase*) from changing other hormones into estrogen. These drugs don't stop the ovaries from making estrogen. They only lower estrogen levels in women whose ovaries aren't making estrogen (such as women who have already gone through menopause). Because of this, they are used mainly in women who are past menopause.

The drugs in this class include:

- Anastrozole (Arimidex)
- Exemestane (Aromasin)
- Letrozole (Femara)

AIs are pills taken once a day.

Can aromatase inhibitors lower the risk of breast cancer?

AIs are used mainly to treat women with hormone receptor-positive breast cancer. But large studies of anastrozole and exemestane have also found that they can lower breast cancer risk in postmenopausal women who are at increased risk.

These drugs are not yet approved in the US to lower breast cancer risk. However, some medical organizations include them as options along with tamoxifen and raloxifene to reduce breast cancer risk in women who are past menopause. For example, they might be a reasonable option for women who have an increased risk of blood clots and therefore should not take tamoxifen or raloxifene. When used to lower the risk of breast cancer, these drugs are taken daily for 5 years.

What are the risks and side effects of aromatase inhibitors?

The most common side effects of AIs are **symptoms of menopause**, such as hot flashes, night sweats, and vaginal dryness.

These drugs can also cause **muscle and joint pain**. This side effect can be serious enough to cause some women to stop taking the drugs.

Unlike tamoxifen and raloxifene, AIs tend to speed up bone thinning, which can lead to **osteoporosis**. People with osteoporosis are more likely to have broken bones.

AIs may **raise cholesterol**. Women with pre-existing coronary heart disease who take an AI may be at risk of having a heart problem.

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

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Preventive Surgery to Reduce Breast Cancer Risk

Should I consider surgery to lower my risk of breast cancer?

For some women who have a very high risk of breast cancer, preventive surgery to remove the breasts (prophylactic mastectomy) or surgery to remove the ovaries (prophylactic oophorectomy) may be options to lower their risk.

You might consider preventive surgery if you:

- Have a mutation in the *BRCA1* or *BRCA2* gene (or certain other genes that increase breast cancer risk) that is found by genetic testing
- Have a strong family history of breast cancer (such as breast cancer in several close relatives, or breast cancer in at least one relative at a young age)
- Have a history of lobular carcinoma in situ (LCIS)
- Had radiation therapy to the chest before age 30
- Have (or have had) cancer in one breast (especially if you also have a strong family history)

Like any type of surgery, these operations have risks and side effects, some of which could affect your quality of life. Because of this, preventive surgery is not usually a good option for women who are at average risk of breast cancer, or for those who are at only slightly increased risk.

Prophylactic mastectomy

A prophylactic mastectomy is surgery to remove one or both breasts to lower the chances of getting breast cancer. While a prophylactic mastectomy can lower this risk by 90% or more, it doesn't guarantee that you will not get breast cancer. This is because it's not possible to remove all breast cells, even with a mastectomy. The breast cells that are left behind might still go on to become cancer.

There are two main situations in which a prophylactic mastectomy might be considered.

For women at very high risk of breast cancer

For women in this group, removing both breasts (known as a *bilateral prophylactic mastectomy*) before cancer is diagnosed can greatly reduce (but not eliminate) the risk of getting breast cancer.

Unfortunately there's no way to know for sure ahead of time if this surgery will benefit any particular woman. For example, most women with a *BRCA1* or *BRCA2* gene mutation will develop breast cancer at some point. Having a prophylactic mastectomy before the cancer occurs might add many years to their lives. But not all women with *BRCA1* or *BRCA2* mutations develop breast cancer. For some women the surgery might not have been helpful. Although they might still get some important benefits from the surgery such as peace of mind, they would also have to deal with its aftereffects.

For women already diagnosed with breast cancer

Some women who have already been diagnosed with breast cancer choose to have the other breast removed (known as a *contralateral prophylactic mastectomy*, or CPM) at the same time to help lower their risk of developing a second breast cancer.

This is more likely to be a good option for women who have other factors that increase their risk of getting another breast cancer, such as a *BRCA1* or *BRCA2* mutation or a strong family history of breast cancer.

But for women without a family history of breast cancer or other risk factors, the benefit of a CPM is less clear. Having breast cancer does raise your risk of getting cancer in the other breast, but this risk is still usually low, and many women overestimate this risk. And while CPM lowers the risk of getting cancer in the other breast, for most women it does not increase the chances of living longer.

It's very important to talk with your health care provider so that you understand how much this type of surgery is likely to benefit you, versus the likelihood of risks and side effects. You might also want to get a second medical opinion, as well as talk to other women who have had this surgery, before deciding if it's right for you.

Prophylactic oophorectomy (removal of the ovaries)

The ovaries are the body's main sources of estrogen, a hormone that can help some breast cancers grow. Women with a *BRCA1* or *BRCA2* mutation can reduce their risk of breast cancer by about half by having a prophylactic oophorectomy, which removes the ovaries (and usually the attached fallopian tubes as well). Some women have this surgery done along with a prophylactic mastectomy.

Women with a *BRCA1* or *BRCA2* mutation also have a high risk of developing ovarian cancer. Most doctors recommend that women with one of these mutations have their ovaries surgically removed once they finish having children to lower this risk.

Removing the ovaries causes a woman to go into menopause. This can lead to symptoms such as hot flashes, trouble sleeping, vaginal dryness, loss of bone density, and anxiety or depression.

Again, it's important to talk to your health care provider so that you're well informed about the possible benefits, risks, and side effects of this type of surgery. You might also want to talk to other women who have had this surgery before deciding if it's right for you.

Other options to reduce breast cancer risk

If you're concerned about your breast cancer risk, talk to your health care provider. They can help you estimate your risk based on your age, family history, and other factors. If you are at increased risk, you might consider taking medicines that can help lower your risk. Your health care provider might also suggest you have more intensive screening for breast cancer, which might include starting screening at an earlier age or having other tests in addition to mammography.

There are also other things that all women can do to help lower their risk of breast cancer, such as being active, staying at a healthy weight, and limit or avoiding alcohol. For more information, see Can I Lower My Risk of Breast Cancer?

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Last Medical Review: September 6, 2017 Last Revised: September 6, 2017

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