

### How to Use this Factsheet

This risk factor summary was developed to serve as a general fact sheet. It is an overview and should not be considered exhaustive. For more information on other possible risk factors and health effects being researched, please see the References section.

A risk factor is anything that increases a person's chance of developing cancer. Some risk factors can be controlled while others cannot. Risk factors can include *hereditary conditions, medical conditions or treatments, infections, lifestyle factors, or environmental exposures*. Although risk factors can influence the development of cancer, most do not directly cause cancer. An individual's risk for developing cancer may change over time due to many factors, and it is likely that multiple risk factors influence the development of most cancers. Knowing the risk factors that apply to specific concerns and discussing them with your health care provider can help to make more informed lifestyle and health care decisions.

For those cancer types with environmentally-related risk factors, an important factor in evaluating cancer risk is the route of exposure. This is particularly relevant when considering exposures to chemicals in the environment. For example, a particular chemical may have the potential to cause cancer if it is inhaled, but that same chemical may not increase the risk of cancer through skin contact. In addition, the dose and duration of time one might be exposed to an environmental agent is important in considering whether an adverse health effect could occur.

Gene-environment interactions are another important area of cancer research. An individual's risk of developing cancer may depend on a complex interaction between their genetic makeup and exposure to an environmental agent (for example, a virus or a chemical contaminant). This may explain why some individuals have a fairly low risk of developing cancer as a result of an environmental factor or exposure, while others may be more vulnerable.

### Key Statistics

Breast cancer is the most frequently diagnosed cancer among women in the United States, except for skin cancers. The American Cancer Society estimates that in 2015, approximately 231,840 women in the U.S. and 5,890 women in Massachusetts will be diagnosed with breast cancer. The disease is expected to account for approximately 29% of all new cancer diagnoses in females.<sup>1</sup> Between 2007 and 2011, invasive breast cancer accounted for 29.0% of cancer diagnoses in females in Massachusetts.<sup>11</sup>

In the United States, breast cancer rates stabilized in the early 1990s, increased in the latter half of the 1990s, and dropped sharply between 2002 and 2003. The sharp drop has been attributed to decreased use of menopausal hormones following the 2002 publication of the Women's Health Initiative study results. This study linked the use of hormone therapy to an increased risk of breast cancer.<sup>2</sup> In Massachusetts, the incidence of invasive breast cancer in females remained stable over the years 2007-2011.<sup>11</sup>

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The chance of developing invasive breast cancer at some time in a woman's life is about 1 in 8. Women are 100 times more likely than men to develop this disease.<sup>2</sup> Men can also develop breast cancer, but male breast cancer is rare, accounting for 1% of all breast cancer cases.<sup>1,9</sup> For more information on breast cancer in men, visit the American Cancer Society website at [www.cancer.org](http://www.cancer.org).<sup>5</sup>

A woman's risk of developing breast cancer increases with age. About 12-13% of invasive breast cancers are found in women younger than 45, while about 66% are found in women age 55 or older. White women are slightly more likely to develop breast cancer than women of other races and ethnicities.<sup>2</sup>

### Types of Breast Cancer

The term "cancer" is used to describe a variety of diseases associated with abnormal cell and tissue growth. Cancers are classified by the location in the body where the disease originated (the primary site) and the tissue or cell type of the cancer (histology).

There are several types of breast cancer, although some of them are quite rare. In some cases a single breast tumor can have a combination of these types or have a mixture of invasive and *in situ* cancer.

*In situ* breast cancers are considered the earliest stage of cancer, when it is confined to the layer of cells where it began. They have not invaded into deeper tissues in the breast or spread to other organs in the body, and are sometimes referred to as non-invasive breast cancers.<sup>2</sup> The remainder of this risk factor summary pertains to invasive breast cancers. Additional information on *in situ* breast cancers and other benign breast conditions can be found at [www.cancer.org](http://www.cancer.org) (American Cancer Society).<sup>3</sup>

An invasive, or infiltrating, cancer is one that has already grown beyond the layer of cells where it started (as opposed to carcinoma *in situ*). Most breast cancers are invasive carcinomas – either invasive ductal carcinoma or invasive lobular carcinoma.<sup>2</sup>

Breast cancer most commonly involves either the milk-producing lobules or the tubular ducts that connect the lobules to the nipple.<sup>6</sup> Roughly 80% of all breast cancers originate in the ducts, and are known as invasive ductal carcinoma (IDC). An additional 10% begin in the lobules, and are known as invasive lobular carcinoma (ILC). Invasive lobular carcinoma may be harder to detect by a mammogram than invasive ductal carcinoma. Both types of cancer can spread (metastasize) from the original site to other parts of the body.<sup>2,6</sup>

Other less common types of invasive breast cancer<sup>2</sup> include:

- inflammatory breast cancer
- triple-negative breast cancer
- medullary carcinoma
- metaplastic carcinoma
- mucinous carcinoma
- Paget's disease
- tubular carcinoma
- papillary carcinoma

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- Phyllodes tumor
- adenoid cystic carcinoma or adenocystic carcinoma
- angiosarcoma

### Established Risk Factors

#### *Hereditary Conditions*

Having a family history of breast cancer increases a woman's risk of developing the disease. Women who have a first-degree relative (i.e., mother, sister) with breast cancer have about twice the risk of developing breast cancer themselves. Having two first-degree relatives with this disease increases a woman's risk by three- to five-fold.<sup>2, 6</sup> The risk is also elevated if several close relatives from either side of the family have been diagnosed with breast or ovarian cancer, especially before age 50.<sup>6, 13</sup> Overall, less than 15% of women with breast cancer have a family member with the same disease. Therefore, over 85% of women who have breast cancer have no familial link to the disease.<sup>2</sup>

About 5-10% of breast cancer diagnoses are thought to be due to an inherited genetic mutation.<sup>2, 15</sup> Most of these mutations occur in the *BRCA1* and *BRCA2* genes. Other genes that may lead to an increased risk for developing breast cancer include *ATM*, *CHEK2*, *TP53* and *PTEN*. Women who inherit these gene mutations have up to an 80% chance of developing breast cancer during their lifetime.<sup>2</sup>

#### *Medical Conditions and Treatments*

Certain benign breast conditions may increase one's risk for breast cancer. Women with proliferative lesions without atypia (i.e., abnormal or unusual cells), which have excessive growth of cells in the ducts or lobules of breast tissue, are 1.5 to 2 times more likely to develop breast cancer compared with women who have non-proliferative lesions.<sup>15</sup> Proliferative lesions with atypia, when the cells are excessively growing and no longer appear normal, raise one's risk by 3.5 to 5 times. Women with denser breast tissue (as seen on a mammogram) have more glandular tissue and less fatty tissue, and have a higher risk of breast cancer.<sup>2</sup>

A woman with cancer in one breast is 3 to 4 times more likely to develop a new cancer in the other breast or in another part of the same breast. In addition, a previous diagnosis of an *in situ* breast cancer puts a woman at increased risk for an invasive breast cancer.<sup>2</sup>

Cumulative exposure of the breast tissue to estrogen is associated with breast cancer risk. Several factors can influence estrogen levels. Women who started menstruating at an early age (before age 12) and/or went through menopause at a later age (after age 55) have a slightly higher risk of breast cancer. Also, women who have had no children or those whose first pregnancy occurred when they were over the age of 30 have an increased risk for developing breast cancer.<sup>2</sup> Women who have had more children and those who have breast-fed seem to be at lower risk.<sup>15</sup>

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Use of hormone replacement therapy is another factor that may affect breast cancer risk. Long-term use (several years or more) of combined post-menopausal hormone therapy (PHT) increases the risk of breast cancer. 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. The use of estrogen-only replacement therapy (ERT) does not appear to increase the risk of breast cancer significantly but when used long-term (for more than 10 years), ERT has been found to increase the risk of ovarian cancer in some studies.<sup>2, 15</sup>

Women who had radiation therapy to the chest area as treatment for another cancer (i.e., ionizing radiation for Hodgkin disease) are at significantly increased risk for breast cancer.<sup>15</sup> This risk appears to be highest if the radiation is given during adolescence or puberty, when the individual's breasts are developing.<sup>2</sup>

From the 1940s through the 1960s some pregnant women were given the drug diethylstilbestrol (DES) because it was thought to lower their chances of miscarriage. These women have a slightly increased risk of developing breast cancer. A woman whose mother took DES while pregnant may also have a slightly higher risk of breast cancer.<sup>2</sup>

### *Lifestyle Factors*

Alcohol consumption has also been associated with increased risk for breast cancer. Compared with non-drinkers, women who consume one alcoholic drink a day have a very small increase in risk whereas those who have 2 to 5 drinks daily have about 1½ times the risk of women who drink no alcohol.<sup>2</sup>

## **Possible Risk Factors**

### *Environmental Exposures*

A great deal of research has been reported and more is being done to understand possible environmental influences on breast cancer risk. Of special interest are compounds in the environment that have been found in animal studies to have estrogen-like properties, which could in theory affect breast cancer risk. For example, substances found in some plastics, certain cosmetics and personal care products, pesticides (such as DDE), and PCBs (polychlorinated biphenyls) seem to have such properties. To date, however, there is not a clear link between breast cancer risk and exposure to these substances.<sup>2</sup>

### *Lifestyle Factors*

For a long time, the role of cigarette smoking in the development of breast cancer was unclear. Recent research, however, supports a consistent association between smoking and an increased risk of breast cancer, with long-term heavy smokers at highest risk.<sup>16, 2</sup> Some studies suggest a relationship between secondhand smoking and an increased risk for breast cancer; however, confirming this relationship has been difficult and is still the subject of active research.<sup>2, 15, 16</sup>

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Recent studies have indicated that being overweight or obese after menopause may put a woman at increased risk of breast cancer.<sup>2, 6, 15</sup> Similarly, women who are physically inactive throughout life may have an increased risk of breast cancer.<sup>2</sup>

Studies have found that women using oral contraceptives (birth control pills) 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 for more than 10 years 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 physician.<sup>2</sup>

Lifetime risk of breast cancer is increased in women of higher socioeconomic status (SES) (e.g. income, education). Research suggests that this may be due to reproductive and lifestyle factors (age at first full-term birth, physical activity, diet, cultural practices, etc.).<sup>6, 15</sup>

Several recent studies have also suggested that working the night shift may be associated with an increased risk of breast cancer. The light-sensitive hormone melatonin may play a role in this link, and further research is being conducted in this area.<sup>2, 10</sup>

### Other Risk Factors That Have Been Investigated

#### *Lifestyle Factors*

Though links have been suggested, antiperspirants, bras, and breast implants have all been investigated as possible risk factors for breast cancer but no associations have been found.<sup>2, 15</sup>

Dietary fat intake is another factor that has been suggested to increase a woman's risk for breast cancer. Though studies have found decreased breast cancer rates in countries with a diet typically lower in fat, studies in the U.S. have not shown an association between the amount of fat in the diet and increased risk of breast cancer.<sup>2, 15</sup>

### References/For More Information

*Much of the information contained in this summary has been taken directly from the following sources. This material is provided for informational purposes only and should not be considered as medical advice. Persons with questions regarding a specific medical problem or condition should consult their physician.*

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