Breast Cancer
Genetic risk

Poornima (name changed)

'My grandmother died of breast cancer at the age of 45 and both my mother and sister have breast cancer. I went to see my doctor to find out about my risk of developing breast cancer. My doctor sent me to a Specialist who has obtained training in Cancer Genetics. After taking a detailed family history, I was asked to undergo genetic testing and I was found to have BRCA2 gene. I have now been informed that I am high risk of developing breast cancer in my life time. The Specialist has given me advice and counseling regarding the options. I am now fully informed about my choices

Radha(name changed)

'When my sister was diagnosed with breast cancer when she was 50, I went to see my doctor to find out about my risk of developing breast cancer. My doctor sent me to a Specialist who has obtained training in Cancer Genetics, where a detailed family history was taken including all the people on both sides of my family who have had cancer. I was told that my risk wasn't affected by my family history and that my risk is similar to the rest of the population.'

Introduction

Breast cancer is the most common cancer affecting women in India. According to Indian Council of Medical Research (ICMR) data, some 150, 000 new cases of breast cancer are diagnosed every year in India. This is only the tip of the iceberg as many cases are not reported to Cancer Registry.

If you or one of your close relatives has been diagnosed with breast cancer, you may have concerns about what this means both for you and for other members of your family.

This article is for people who would like to know more about breast cancer in families. It explains the three main risk factors for breast cancer, what is meant by a significant family history of the disease, and what to do if you think this may apply to you or to members of your family. Although this article is aimed mainly at women, much of the information is relevant to men as well.

In relation to health, risk is commonly talked about in two ways: relative risk and absolute risk.

- **Relative risk:** The chances of something happening to a group of people exposed to a particular risk, compared with a group of people who are not exposed to that risk. For example, smokers have a greater relative risk than non smokers of developing lung conditions. Relative risk is often reported as a percentage.
- **Absolute risk:** The chances of something happening to a person over a certain period of time. For example, we all have an absolute risk of developing different conditions such as cancer and heart disease. Absolute risk is often reported as a figure, such as '1 in 9'. All these different ways of expressing risk can be confusing and it's hard to know how a risk relates to you.

Media reports on new stories about 'risks'

Breast cancer always seems to be in the news, and you will often see head lines saying that something 'causes' or 'is linked to' breast cancer. But when you look behind these headlines the true story can be very different. Some of the news stories about breast cancer risk are based on limited or questionable research, or involve only a small number of people. Sometimes the results are exaggerated or

presented in a misleading way, and the risk itself – if proved at all – is very small. So if you've heard a breast cancer risk story that concerns you, finding out more about the research behind it can help you decide what the risk means to you.

Breast cancer risk

We still don't know what the exact causes of breast cancer are, or why some people get breast cancer and some don't. Research suggests that breast cancer is caused by a combination of many different things. Out of all the people diagnosed with breast cancer, only a small number will know why they have developed it – those found to have inherited a fault in a known breast cancer gene.

We do know that some things can alter the likelihood of getting breast cancer. These are called 'risk factors'; they have the potential to either increase or decrease our risk of developing breast cancer.

Identifying risk factors can help us to see if there are any ways we can reduce our risk. But it's important to remember that in many cases the increased or decreased risk from these factors is very small.

Having one or more risk factors might mean that the likelihood of you developing breast cancer is only slightly greater than if you didn't have these risk factors. It doesn't mean that you will develop breast cancer, and your individual risk may still be small overall. One person may have many risk factors and not develop breast cancer, while another may have very few risk factors and be diagnosed with the disease

It's also important to remember that your individual risk is unique and may change over time – for example as you get older or if your family history changes (by someone receiving a cancer diagnosis).

The three main risk factors for breast cancer are things that we can't do anything to change – gender, increasing age and a significant family history.

Gender

Being a woman is the single biggest risk factor for developing breast cancer. So if you're a woman, your risk of getting breast cancer is much higher than if you are a man.

Increasing age

After gender, age is the next most important risk factor for developing breast cancer – the older the person the higher their risk. Most breast cancers in the Western World (around 80 per cent) occur in women over the age of 50 & most men who get breast cancer are over 60. However, in India most breast cancers are diagnosed a decade earlier compared to the Western world and are commonly seen in women in their 40s. The reasons are unknown. The lifetime risk of developing breast cancer in India overall is around 1 in 28 and in Urban India it is1 in 22.

Significant family history

A small number of women have an increased risk of developing breast cancer because they have a significant family history. A family history records the past and present illnesses of your blood relatives (people related by birth rather than marriage) over several generations – for example, your mother and father, their brothers and sisters (your uncles and aunts), their parents (your grandparents) and their brothers and sisters (your great uncles and great aunts).

When taking a family history, your mother's side of the family and your father's side are looked at separately.

A family history may be described as significant where there are, on the same side of the family:

- one or more close relatives who have had breast cancer before the age of 40.
- two or more close relatives who have had breast cancer.
- close relatives who have had breast cancer and others who have had ovarian cancer.
- one close relative who has had breast cancer in both breasts (bilateral) or who has had breast and ovarian cancer.
- a male relative who's had breast cancer.

However, most women do not have a significant family history and so their overall breast cancer risk is not affected.

Breast cancer in the family

Breast cancer is the most common cancer affecting women in India. So even if you have a relative with the disease it doesn't necessarily mean that you are more likely to get breast cancer yourself.

Most breast cancers are not due to inherited (genetic) factors and do not affect the lifetime risk for other relatives. In relation to the level of risk, breast cancer in families can usually be classed in one of three groups, and you may hear these groups referred to in a number of different ways:

- Average risk(also called sporadic or near population risk).
- Moderate risk(also called familial/raised risk).
- High risk(also called hereditary/increased risk).

If you're concerned about your risk of developing breast cancer it's important that you get professional advice tailored specifically to you and your family. By getting details of your family history, your Specialist can assess whether or not your risk of breast cancer is higher because of your family history and whether any further action is recommended.

Average risk (sporadic or near population risk)

Sometimes this level of risk is referred to as near population risk because it means that your risk is the same or very similar to the risk for women who do not have a significant family history of breast cancer.

Most breast cancers are not inherited and so do not increase the lifetime risk for other members of the family. This is likely to be the case in a family where one person has been diagnosed with breast cancer over the age of 40.

Moderate risk (familialr/raised risk)

This is sometimes referred to as raised risk because it means that your risk is higher than average – but it's still more likely that you won't get breast cancer as a result of your family history. A woman at moderate risk may have several relatives with breast cancer but no obvious pattern of the disease. In these families, although breast cancer may affect people in several generations, they tend to be affected at older ages.

Breast cancer in these families is not likely to be caused by high-risk altered genes and, although there may be lower risk genes involved, currently there's no genetic testing available for this. It's possible that lifestyle and environmental factors may also influence breast cancer in these families, but at present there is no reliable evidence to support this.

High risk (hereditary/increased risk).

A woman who has an increased risk of breast cancer is more likely to develop the disease in her lifetime than other women – although this does not mean that she'll definitely get breast cancer.

This level of risk is sometimes referred to as high risk, but even within this risk category there are several different levels of risk. A woman who has a high risk of breast cancer is more likely to develop the disease in her lifetime than other women – although this does not mean that she'll definitely get breast cancer.

Women assessed to be at high risk usually have several close relatives with breast cancer over several generations – for example, grandmother, mother and daughter. Often these relatives will be affected at a young age.

This type of family history may be due to an altered breast cancer gene. If genetic testing shows there is an altered breast cancer gene in the family this is known as hereditary breast cancer. Remember that even if a woman has an altered breast cancer gene she will not necessarily develop breast cancer.

Only a very small proportion of women with breast cancer(5 to 10 per cent) will have an altered breast cancer gene. The two genes that are most often found in hereditary breast cancer are called BRCA1 (breast cancer 1) and BRCA2 (breast cancer 2).

Another gene that can lead to breast cancer when altered is called TP53 (Tumour suppressor Protein 53), but it's much rarer for a woman to have a problem with this gene. There may also be other genes that cause breast cancer that haven't yet been found. Even if you or your family members appear to be at moderate or high risk, this doesn't mean you or they will definitely develop breast cancer.

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Assessing breast cancer risk

If you're concerned about your risk the first step is to talk things over with your doctor who should refer you a doctor who has obtained Specialist training in Cancer genetics

At the appointment

You will be asked about the family history of all your blood relatives on both sides of your family. This includes your mother and father, sons and daughters, brothers and sisters, aunts and uncles, nieces and nephews, grandparents, great uncles and great aunts. Try to find out as much about your family history as you can from other relatives before your appointment. You may be asked to do this by questionnaire before being offered an appointment or you may be asked in the clinic.

You will be asked about:

- what type of cancer/s have been diagnosed in your family?
- How old each person was when diagnosed?
- where in the body the cancer started?
- whether the same family member has had more than one cancer (including cancer in both breasts)?
- ethnic background?
- whether the relatives with cancer are male or female?

If you're adopted or if you don't have any information about your biological family, your risk assessment can only be based on whatever information you have.

What happens if I'm at average risk?

In a family where one person over 40 has been diagnosed with breast cancer, this is likely to be breast cancer that has happened by chance. Most breast cancers fall into this group. If your family history has been assessed as average, this means that family members are likely to have a similar risk to other women in the general population.

Even if your risk is not increased, it's important to be breast aware and go back to your Doctor if you notice any changes in your breasts. It's important to go back to your Doctor if your family history changes – for example if another relative develops breast or ovarian cancer.

From the ages of 40 onwards, it is important for all women to have a screening Mammogram annually.

What happens if I'm at moderate or high risk?

If your family history assessment suggests that you're at a moderate or high risk of developing breast cancer in the future, you're likely to be offered some of the following options.

Breast screening

The type of screening you'll be offered will depend on your age and your risk. Men, even if they are gene carriers, are not offered screening. This is because even though a man's risk for developing breast cancer increases, the increased risk is still less than women's in the general population. Women should have annual screening Mammograms.

Research has shown BRCA gene carriers who have an altered gene may benefit having both mammogram and Magnetic Resonance Imaging (MRI) screening. MRI screening uses strong magnetic fields and radio waves to produce a detailed image of the inside of the body.

Women at high risk between the ages of 30 and 40 (who are known to have an altered gene themselves or an altered gene has been identified in their family) may be offered mammograms and/or MRI screening. In women under 30 who are found to be at very high risk (for example TP53 gene carriers), breast MRI screening has been shown to help in detecting breast cancers. Mammogram x-rays are not useful in women under 30 because the breast tissue is more dense (tightly packed) due to female hormones and this can sometimes make it difficult to see changes in the breasts.

Genetic counseling

If you're referred for genetic counseling, you should meet with a doctor with specialist training in genetics. The doctor can help you understand more about your family history, your risk of developing breast cancer and the options that may be available to you, such as genetic testing, screening and surgery to reduce the risk of cancer (risk-reducing surgery).

If you don't know the answers to some of the questions you are asked at the meeting, you may need to go away and find out more about your family history.

It may also be worthwhile writing down any questions you have before your appointment, so you don't forget anything important. For many people, genetic counseling can be a very emotional time.

Genetic testing

Following your appointment with a doctor with specialist training in genetics, genetic testing may be an option for you and other members of your family. Only a few people will be offered genetic testing and, even if it is an option for you, you may choose not to be tested. Genetic counselling involves discussion of the implications of the test and the possible outcomes, sometimes over several visits.

First stage

This involves taking blood from someone in your family who has been diagnosed with breast cancer or ovarian cancer and checking this for one of the known altered genes. The results from this test are usually available within two months.

If none of the people in your family who have had breast or ovarian cancer are still alive, it may be possible to have a genetic test. Your doctor will be able to advise you on the options available.

Second stage

If an altered gene has been found in the person with breast cancer, it means that a genetic test is available for other relatives to see whether or not they also carry the altered gene (this is called a predictive test). The result of a predictive test doesn't usually take so long because clinical scientists know exactly where to look.

If you don't have the altered gene that was identified in your family then you have the same risk of developing breast cancer as other women in the general population and you won't have passed the gene on to your children. If you're found to carry an altered breast cancer gene that was identified in your family you won't necessarily go on to develop breast cancer. However, you do have a higher risk of developing the disease than people without an altered gene.

Risk-reducing surgery

If you're at high risk of developing breast cancer your doctor will discuss the possibility of surgery to reduce your breast cancer risk. This involves removing both breasts (bilateral mastectomy) and is called risk-reducing surgery. Reconstruction of both breasts is usually offered at the same time, which means rebuilding the breasts using an implant and/or tissue from another part of the body.

Although having a bilateral mastectomy significantly reduces the risk of developing breast cancer it cannot completely remove the risk. Some women who carry an altered gene are also at higher risk of developing ovarian cancer.

Having the ovaries and fallopian tubes removed by surgery (bilateral sapling-oophorectomy) before the natural menopause (when your periods stop) has been shown to reduce the risk of both ovarian and breast cancer. Sometimes when discussing removal of the ovaries and fallopian Tubes, your specialist may also discuss removing the womb (hysterectomy) at the same time. If you are younger than 50 when you have a risk-reducing salpingo-oophorectomy, your specialist may suggest that you take hormone replacement therapy (HRT) for a short time to help with any menopausal symptoms. There is good evidence that doing this will not affect the breast cancer risk-reduction gained from having the surgery.

Future family

Some couples are concerned about passing an altered breast cancer gene to future children.

Pre-natal diagnosis (PND)

There are two procedures which can look for a known altered gene while you are pregnant – chorionic villus sampling (CVS) or amniocentesis. Both of these procedures are done by a doctor specializing in fetal medicine.

Pre-implantation genetic diagnosis (PGD)

If you are thinking about becoming pregnant, you may want to talk to your doctor about pre-implantation genetic diagnosis. PGD involves going through an IVF (in-vitro fertilization) cycle where the embryos that are produced can be checked for the known affected gene before being transferred into the womb. PGD only transfers the embryos that are not affected by the breast cancer gene.

Your feelings

Concerns about inheriting breast cancer are common among women who've had relatives with breast cancer. If you've been advised that you are at average risk you may feel reassured and relieved. Finding out that you're at moderate or high risk of developing breast cancer can cause many different emotions. You may feel more anxious about your breast health, or afraid of what the future holds for you as you approach the age at which a relative was diagnosed.

It is important that you go back to your Doctor if your family history changes or if you have any concerns regarding genetic counseling issues which you have not fully understood.

Other risk factors

There are other known factors, some of which are listed below, that may slightly increase the risk of developing breast cancer.

Factors increasing risk:

- periods starting before the age of 12
- menopause after the age of 50
- not having children
- first pregnancy at the age of 30 or over
- taking hormone replacement therapy (HRT) – depending on what type you take and how long you take it (the risk reduces over time once you stop)
- taking the oral contraceptive pill for a number of years (the risk reduces over time once you stop)
- being overweight, especially after the menopause

- drinking more alcohol than the recommended daily amount (two units for women, three for men)
- a few types of benign (non-cancerous) breast problems
- exposure to high levels of radiation.

Having one or more factors that increase risk does not mean that you will develop breast cancer. Having one or more risk factors might mean that the likelihood of you developing breast cancer is only slightly greater than if you didn't have these risk factors and your individual risk may still be small overall. There are also several factors which may decrease your risk of developing breast cancer. And some of these are listed below.

Factors decreasing risk:

- periods starting after the age of 15
- menopause before the age of 45
- having children (especially having the first before the age of 20)
- breastfeeding (for a minimum of five months – this could be one baby or more)
- risk-reducing surgery (only for those who have inherited a faulty gene)
- taking regular exercise.

Can you reduce your breast cancer risk?

Many risk factors are out of your control. You can't stop yourself getting older, and you can't change when your periods start or stop. Try not to become anxious and worried about risk factors that you can't do anything to change. Certain risk factors, though, can be influenced by changing some of the ways you live your life.

Lifestyle changes that may reduce your risk are:

- keeping your weight within healthy limits, especially after the menopause.
- taking regular exercise and keeping active.
- eating a well-balanced diet and limiting your intake of saturated fat.
- limiting how much alcohol you drink.

However, making lifestyle choices may not stop breast cancer from developing.

Common myths about risk factors

You may have heard stories of other things being linked to breast cancer risk. However, there is insufficient evidence that any of the following increase risk:

- an injury to the breast
- deodorants/anti-per spirants
- stress
- nipple piercing
- wearing an underwired bra.

Be breast aware

Whatever your risk and lifestyle choices, by being breast aware it's more likely that if you do develop breast cancer it will be found as soon as possible. This means it's more likely to be treated successfully. By being breast aware you'll become familiar with your breasts and the way they change throughout your life.

By being breast aware and following the awareness 5-point code you'll become familiar with your breasts and the way they change throughout your life.

Breast Awareness 5 Point Code

- Know what is normal for you
- Know what changes to look & feel for
- Look and feel
- Report any changes to your Doctor without delay
- Have Mammogram (X- ray of the breast) at least once in two years from the age of 40 (ideally every year)