

## Women's Cancer Information Project

Coordinated by the European Institute of Women's Health

### CANCER AND THE GENETIC LINK

In Ireland, breast cancer is one of the most common cancers affecting women. 1 in 14 Irish women will develop a breast cancer malignancy. Breast cancer is the leading cause of cancer related deaths in Irish women. Ireland has the second highest rate of death from breast cancer amongst European countries. Estimates show that between 5 and 10% of breast malignancies result from an inherited predisposition – where altered genes are primarily responsible.

#### Genes

Each cell in our body contains two copies of all our genes. Genes control how we develop, for example, height and colouring. They also determine many things that happen during our life, such as diseases that may affect us. Exposure to environmental factors – sunlight, radiation and cigarette smoke are important in this regard. When a cell changes into a cancer cell, several changes have occurred in some of these genes, which results in uncontrolled growth. In most people who develop cancer these genetic changes occur only in the cancer cell itself. However, in certain cases the first of these changes is inherited. This has certain implications:

- a genetic alteration is present from conception.
- individuals so affected carry the altered gene from birth.
- persons carrying the altered gene have a 50% chance of passing on this to their natural children.

**The presence of a cancer predisposition gene does not mean that cancer will develop. It does mean that the risk of cancer is increased significantly.**

#### Possible effect of Family History

Women who have a strong family history of breast / or ovarian cancers have an increased chance of carrying a cancer predisposed gene.

#### This risk increases:

- Where there is a greater number of cancers in the family.
- Where cancers have been diagnosed at a young age
- Breast cancer before 40
- Where women have breast cancer in both breasts.
- Two or more relatives with breast cancers, especially if one got this before 50.

In the above cases, an altered gene *may be* responsible for cancers in your family.

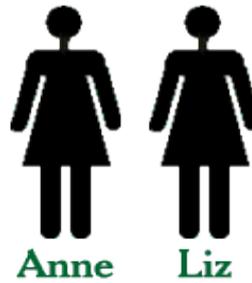
#### What can you do?

- You should speak to your GP for information and advice.
- S/he will need to know details of your family history:
- What relatives have had cancer?
- What type of cancer have they suffered from?

- What age were they when they were diagnosed?
- If they have died, at what age?

This will provide the information to your GP to reassure you that there is probably not an altered gene in your family. Alternatively, s/he may suggest that you see a specialist for advice.

Anne and her sister  
Liz were both diagnosed  
with Cancer.



### **What risks are there if I have a family history?**

If your family history of breast cancer seems to indicate an altered gene, you may have a higher risk of breast cancer developing. However, even people who have an altered gene may not get breast cancer. Every person and their families are different – so you should seek advice from your family doctor that will be specifically for you.

### **How do I get specialist assistance?**

The first step is to contact your GP. Your GP will advise you on any appropriate steps that have to be taken.

- They may refer you to a hospital and an appropriate cancer specialist.
- There you should be able to obtain information on:
  - Your own risk of getting breast cancer.
  - The potential risk to other members of your family.
  - What screening programmes are available- mammograms and regular breast checks.
  - Genetic testing.

You may be given an examination or, if you wish, a mammogram (breast x-ray). You may also be referred back to your GP with recommendations for screening and check ups.

### **If you are not at higher risk due to your family history**

- Remember there is still a 1 in 14 risk of getting breast cancer.
- Carry out regular [breast checks](#).
- Get to know what they look and feel like normally.
- If you notice anything unusual, or have any worries, contact your GP.

- If you are over 50, you may wish to discuss mammogram screening with your GP.

## More details on genetics

Several genes are known to confer an increased risk of breast cancer. These are BRCA1 and BRCA2. (BRCA – stands for BReast CAncer) Current research suggests that 66% of all breast cancer cases are due to hereditary factors. (5%+ of all cases in Ireland) The lifetime risk for women who have the BRCA1 gene present is approximately 80% and the lifetime risk of ovarian cancer is 40%. Other cancers occur more frequently in these families. BRCA2 is also linked to the early onset of breast cancer and increases the risk of ovarian cancers. How cells work When a new cell is dividing it makes a complete copy of its genetic information. When one cell divides into two, each cell has a complete copy of this genetic information in the form of DNA. The DNA contains complete instructions which tell the new cells how to function and behave, including when and how fast to divide. Normal DNA also contains instructions telling the cells when to stop dividing. Normal cell division always stops at some point. Cancerous cells are basically like any other cells in our body except that the DNA in them is distorted or lack information. As a result these cells continue to divide and grow without any regulation or restraint. They then compete with the body's normal cells for the body's resources. Research shows that certain cancers have a genetic link. Cells in the body can become cancerous causing distortions in their DNA. This will cause them to become the initial cells in a cancerous tumour. These distortions in the DNA are known as genetic lesions.

## What are genes?

- Genes contain complete instructions telling cells how to function and how to behave, including when and how fast to divide.
  - Each cell in the body contain about 100,000 genes.
  - In any given cell only a small number of genes are used, as different cells have different purposes, and hence not all the instructions are required.
  - You inherit your genes from your mother and your father.
  - If cells divide when they are not needed, they form a mass of extra tissue called a tumour, which may or may not be cancerous.
  - Cells go out of control in this way due to changes in their genes, so that the set of instructions is not as it should be.
  - Some changes happen during a person's lifetime, others are inherited from their parents.
  - In cases where breast cancer seems to run in the family, it is possible that a gene with a vital change is being passed down from one generation to another.
  - This kind of breast cancer, which is due to an altered gene being inherited, accounts for approximately 5% of all breast cancers cases.
-