Familial Breast Cancer

Division of Human Genetics
University of Cape Town

What is Breast Cancer?

Breast cancer is a malignant tumour of the breast, usually affecting the tissues involved in milk production (the ductal or lobular tissues). Breast cancer is suspected in individuals with clinical findings such as a breast lump, breast thickening, breast skin change, or changes on mammography. Breast cancer occurs when breast cells grow out of control forming a tumour.

How common is Breast Cancer?

Breast cancer is a common disease in women.

1 in 8 women will develop breast cancer by the age of 70 years. 1 in 100 will develop ovarian cancer by the age of 70. Therefore many people have a family member who has had breast cancer. Contrary to popular belief, men can also develop breast cancer, but it is rare.

What causes Breast Cancer?

The causes of breast cancer are complex and involve interactions between genetic and environmental factors.

a) Genetic Factors

Most cells in the body are continually growing, dividing and being replaced. Breast cancer, like other cancers, can be the result of faults (called **mutations**) in genes. These genes, called **control genes**, normally instruct the cell to grow and divide in an orderly manner. When one or more of these genes contain a mutation, the cell can grow out of control and a cancer may develop.

b) Environmental Factors

The environmental factors causing the mutations in the control genes in the breast are still unknown but may include exposure to various reproductive hormones, early menarche (menstruation before 12 years old), late menopause, older age at first-full term pregnancy, radiation, lifestyle and diet.

What are the main risk factors for Breast Cancer?

There are many risk factors, which can influence a woman's chance of getting breast cancer. Two of the most important are:

- **being a women** and
- **getting older**

Other risk factors include:

- having a **family history** of breast cancer
- having **already had** breast cancer.

What is meant by a family history of Breast Cancer?

A family history of breast cancer means having one or more blood relatives who have, or have had, breast or ovarian cancer. These relatives could be on either the father's or mother's side of the family. Close relatives are parents, siblings or children (first-degree) or aunts, uncles, nephews, nieces or grandparents (second-degree). Relatives by marriage (in-laws) or by adoption do not count in determining the family risk of genetic conditions.

What is familial (hereditary) Breast Cancer?

In a small number of families, women over several generations have had breast or ovarian cancer. **It is estimated that between 5 and 10% of all breast and ovarian cancers are inherited.** In these cases women inherited a *faulty copy* of one of the control genes in the breast or ovary from either of her parents, making it more likely for them to get breast or ovarian cancer.

What Genes are involved?

The two most common genes related to familial breast cancer are **Br**east **Ca**ncer **1** gene **(*BRCA1*)** and **Br**east **Ca**ncer **2** gene **(*BRCA2*)**. *BRCA1* and *BRCA2* are special control genes known as **tumour suppressor genes** and their role is to act as the "brakes" on uncontrolled cell growth. Every man and woman has the *BRCA1* and *BRCA2* genes in their cells.

There are also many other control genes in which inherited mutations that make the genes faulty can contribute to the development of breast or ovarian cancer.

How are these genes inherited?

We inherit two copies of each of our genes, one from our father and one from our mother. If one parent (either the mother or the father) has a faulty BRCA1 or BRCA2 gene, this can be passed down to their children.

Each child has a 50% chance of inheriting that parent's faulty gene (with a mutation) and a 50% chance of inheriting that parent's normal gene.

A women who inherits a faulty BRCA1 or BRCA2 gene will not always get cancer **but her chances of developing breast or ovarian cancer during her lifetime is much higher** than that of a woman with two normal copies of the BRCA1/2 gene.

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How does my family history affect my risk of Breast Cancer?

Because breast cancer is common, most women will have someone in their family with breast cancer. When looking at whether breast cancer in the family is important in **increasing risk**, the following are good indicators:

Two or more close blood relatives on either the mother or father's side of the family with breast or ovarian cancer, plus one or more of the following features on the same side of the family:

- Breast cancer before the age of 40
- Breast cancer in both breasts
- Breast and ovarian cancer in the same woman
- Breast cancer in a male relative
- Jewish ancestry

What can I do if I think I have a strong family history of Breast Cancer?

If you are concerned about your family history of breast cancer contact the familial breast cancer clinic (see contact details). This clinic provides specialists such as trained genetic counsellors and clinical geneticists who can give expert information about this complex issue. They can help to:

- clarify your risk of breast cancer based on your family history,
- answer any questions you may have about your family history,
- discuss what medical check-ups are appropriate for you and
- discuss the advantages, disadvantages and appropriateness of genetic testing.

Genetic Testing and Breast Cancer

In some families with a strong family history genetic testing could be an option. Several breast cancer-causing mutations have been identified in BRCA1 and BRCA2. The Division of Human Genetics at UCT tests for two mutations in the BRCA1 and one in the BRCA2 gene that increase the risk of developing breast cancer. These three mutations are common in **Ashkenazi Jewish women**. Testing is firstly done on a family member who has or had breast or ovarian cancer to identify mutation(s). Women related to this family member whose family history suggests a potentially high risk of developing breast cancer can then be tested for the mutation found in the affected family member, if they are over 18 years of age. This is known as **presymptomatic screening** or **predictive testing**.

Genetic testing will only be done following genetic counselling and based on the evidence of a strong family history of breast cancer.

How long will I have to wait for my results?

Once blood has been drawn it usually takes up to 4 weeks for the results to be available.

The results will be communicated to you personally via your general practitioner/referring clinician or by the staff of the Division of Human Genetics at the University of Cape Town.

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What are the important issues when considering Genetic Testing?

There are many important issues that you should consider **before** having genetic testing. These should be discussed with a genetic counsellor and include:

- A **positive result** (i.e. a fault was found in the *BRCA1* or *BRCA2* gene) does not mean you will definitely develop breast cancer, **but your risk increases to 85%.**
- A **negative result** (i.e. you do not have any of the faults that were tested for) does **not** guarantee you will not develop breast cancer. You will still have the same risk as any woman in the population (1 in 8) and should therefore continue with regular surveillance.
- The **limitations** of current breast cancer testing means you may have another mutation in *BRCA1* or *BRCA2* or other genes that was not looked for in this laboratory. Further testing is available elsewhere.
- Finding out your genetic risk for breast cancer can have important implications for other members of your family who may find they are at an increased risk.

What should I do about my Breast Cancer risk?

We can't yet prevent breast cancer but we know that the earlier breast cancer is detected, the more successful the outcome will be. Therefore:

- Women should examine their breasts every month and visit their doctor annually or promptly when they feel or see any breast changes.
- All women over the age of 50 should have a mammogram (breast examination) every two years.
- Women of any age who are at potentially high risk should see a cancer specialist to plan the best early detection program for them.
- If you are concerned about your family history of breast cancer, consult your doctor about a referral to a familial breast cancer clinic.

Where can I read more about familial breast cancer?

1. Genetics Home Reference Website:
http://ghr.nlm.nih.gov

2. Gene Reviews
http://geneclinics.org//profiles/brca1/index.html

3. Website on Genetics and Breast Cancer Risk
http://www.breastcancer.org/genetics_breast_cancer.html

Contact Details:

A Familial Breast Cancer Clinic is held at Grootte Schuur Hospital on the **first Friday of every month.** Please contact:

Genetic nurses:
Tel: (021) 404 6235/ 406 6304