Genetic testing for BRCA1 and BRCA2

This leaflet explains more about genetic testing for someone who has cancer and has a chance of having a change (mutation) in one of two genes, called BRCA1 and BRCA2. If you have any questions or concerns, please contact your genetics clinician (details at the end of this leaflet).

Cancer in the general population
Cancer is a common condition. It will affect half (50%) of the people in the general population. For women in the general population, the lifetime risk (the chance of getting it at some point in life) of breast cancer is one in eight (12.5%), and the lifetime risk of ovarian cancer is one in fifty women (2%). We know that the main thing that increases your risk (risk factor) is increasing age. The older we get the more likely we are to develop cancer as our bodies become less effective at protecting us. Most cases (90–95%) happen by chance, but a few (5–10%) happen when someone has inherited an increased risk of developing cancer.

What is inherited cancer?
In some families, we see more cases of breast, ovarian or prostate cancer than we would expect to see by chance. We know that in some of these families, the cancer is due to an inherited (from our parents) susceptibility (risk of cancer). This can be caused by changes in genes such as BRCA1 and BRCA2, which normally function to protect us from developing cancer.

What are genes?
Genes are coded messages which give instructions for how cells grow and function. Genes come in pairs. We all have two copies of each of these genes as we inherit one copy from each of our parents.

The normal function of the exact genes being tested is to help protect us from developing cancer. A mutation in one copy of a gene causes an increased cancer risk in people who carry it.

If someone has a mutation in one copy of a gene, they have a one in two (50%) chance of passing on the mutation to each child they have, whatever their gender or the child’s gender.

What is a diagnostic genetic test?
A diagnostic genetic test involves taking a blood sample from you. We will then examine your blood to see if you have a gene mutation that we know is associated with inherited breast and possibly other cancers. The results will take up to 10 weeks. We can send them to you, call you with them, or you can come to the clinic to collect them.

Extra genetic tests may be suggested to families based on their individual family history of cancer.
**What are the possible results of BRCA1 and BRCA2 gene testing?**

**Testing does not find a mutation in either the BRCA1 or BRCA2 genes**
If this happens, the chance of a BRCA gene mutation being responsible for your history is small, but other genetic factors could be involved if you have a family history of cancer. We will not have a genetic test to offer your relatives who have not had cancer.

**Testing finds an ‘unclassified variant’ in the BRCA1 or BRCA2 genes**
We have found a variant in one of your genes but we do not know if this is significant. This happens in about 1 in 20 (5%) cases. Future medical research may be able to tell us if these variants relate to a family history of cancer. We will not be able to use the test result to make decisions about cancer risk management for you or other family members.

**A gene mutation is found**
This confirms an inherited susceptibility to breast, ovarian and possibly other cancers.

**BRCA1**
For women with a mutation in the BRCA1 gene, there is an up to 70% (just over two thirds) lifetime risk of developing breast cancer and an up to 45% (almost half) lifetime risk of developing ovarian cancer. For women who have already been affected with breast cancer, we know there can be an up to 65% (two thirds) chance of them developing another breast cancer in the future. This can be influenced by the age of her first breast cancer diagnosis. Sometimes, knowing that someone has a BRCA gene mutation may help to direct potential treatment or surgical options.

Men with a mutation in the BRCA1 gene may have an up to 15% (just over one in eight) lifetime risk of developing prostate cancer.

**BRCA2**
For women with a mutation in the BRCA2 gene, there is an up to 70% (just over two thirds) lifetime risk of developing breast cancer and an up to 20% (1 in five) lifetime risk of developing ovarian cancer. For women who have already been affected with breast cancer, we know there can be an up to 65% (two thirds) chance of them developing another breast cancer in the future. This can be influenced by the age of her first breast cancer diagnosis. Sometimes, knowing that someone has a BRCA gene mutation may help to direct potential treatment or surgical options.

Men with a mutation in the BRCA2 gene may have an up to 25% (quarter) lifetime risk of developing prostate cancer and about an 8% (less than one in ten) lifetime risk of breast cancer. Men and women with a BRCA2 gene mutation have a small risk (three in 100) of pancreatic cancer.

**What can you do if you have a BRCA1 or BRCA2 mutation?**
Women who are carriers of a BRCA gene mutation can have breast screening from the age of 30. The purpose of this screening is to help the early detection of breast cancer.

Unfortunately, we are not currently able to offer ovarian screening as it has not been proven to be effective. Some women who are carriers of a BRCA1 or BRCA2 gene mutation may choose to have surgery to reduce their risk of developing a further cancer. This is done by removing as much as possible of the ‘at risk’ tissue, for example the breast and/or ovaries/fallopian tubes.
This is known as prophylactic (preventative) or risk-reducing surgery. This is obviously a very personal decision for any woman. Before making this decision, we would encourage a discussion with one of our breast or gynaecological surgeons to see if this is the right decision for you. This can be accessed through the Hereditary Breast and Ovarian Cancer (HBOC) Family Service (more information later in this leaflet).

**What can be done if you decide not to undergo testing?**

Not every woman who has been affected by cancer will choose to have genetic testing.

If you decide not to have genetic testing, you and your family members may still be eligible for regular breast screening.

**Things to think about**

Deciding to have diagnostic genetic testing can be a difficult and complex process. You may want to consider the points below before testing:

- **Timing** – Why now? Will it change your immediate treatment? What other challenging events are happening in your life?
- **Psychological impact of knowing** – How would you feel if a BRCA mutation was identified? How would you share this information in your family?
- **Assessing your own coping strategies** – How have you dealt with difficult situations in the past? What strategies do you use to help you deal with difficult news?
- **Next steps** – What measures might you think about taking to address your risks of breast and ovarian cancer if we find that you have a gene mutation?

There are no right or wrong answers to these questions, but it may be best to think about what the answers may be, so that when you get your result you have an idea of what you might do.

**Support**

Undergoing diagnostic genetic testing and receiving the results can be a challenging time. Some people might wish to talk through their feelings, coping strategies and other issues before making a decision, or after receiving their result.

Several support options are available to BRCA carriers, including the following:

- your genetics clinician
- the HBOC Family Service
- BRCA support groups
- clinical psychologist
- your GP
- cancer charities such as Breast Cancer Now (Someone Like Me service) and Macmillan.

Your genetics clinician will discuss these with you in more detail so you can work out what the best sources of support will be for you.

**The HBOC Family Service**

BRCA carriers are invited to our HBOC Family Service clinic. You will be able to ask questions and discuss your management in detail with a team of specialists. If we find you have the mutation, following giving you this result, we will send you an invitation to the clinic, a leaflet about this service, and a psychological questionnaire to complete.
Research studies
Whatever your result is, there may be a chance for you to take part in research. Your genetics clinician or a research nurse will discuss this with you. For more information, contact a member of the research team, t: 020 7188 2603.

Useful sources of information
Breast Cancer Now. UK-wide charity providing care, information and support to people affected by breast cancer, t: 0808 800 6000 (helpline, Monday to Friday 9am-4pm, Saturday 9am-1pm), e: info@breastcancernow.org.uk w: www.breastcancernow.org.uk

Someone Like Me. Service provided by Breast Cancer Now. Puts you in touch with a trained volunteer who has (or has had) primary breast cancer, or is undergoing genetic testing, for advice and support, t: 0345 077 1893 (helpline, Monday to Thursday, 9-5pm, Friday 9-4pm) e: someonelikeme@breastcancercare.org.uk w: www.breastcancernow.org/

Macmillan Cancer Support. Support and advice charity for people affected by cancer, t: 0808 808 0000, 7 days a week, 8am-8pm, w: www.macmillan.org.uk

Contact us
If you have any questions or concerns, please contact your genetics clinician, t: 020 7188 1364, Monday to Friday, 9am-5pm.

Cancer Genetics Service, Guy’s Regional Genetics Service, Guy’s Hospital, Great Maze Pond, London SE1 9RT.

Guy’s and St Thomas’ hospitals offer a range of cancer-related information leaflets for patients and carers, available at www.guysandstthomas.nhs.uk/cancer-leaflets. For information leaflets on other conditions, procedures, treatments and services offered at our hospitals, please visit www.guysandstthomas.nhs.uk/leaflets

Dimbleby Cancer Care provides cancer support services for Guy’s and St Thomas’. We have a drop-in information area staffed by specialist nurses and offer complementary therapies, psychological support and benefits advice for patients and carers.

Dimbleby Cancer Care is located in the Welcome Village of the Cancer Centre at Guy’s. t: 020 7188 5918 e: DimblebyCancerCare@gstt.nhs.uk

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