Genetic testing for breast cancer susceptibility

This leaflet explains more about genetic testing for a breast cancer susceptibility gene panel. If you have any further questions or concerns, please do not hesitate to contact your genetics clinician on 020 7188 1364.

Cancer in the general population
Cancer is a common condition. It will affect one in two people in the general population. For women in the general population, the ‘lifetime risk’ of breast cancer (the chance of getting it at some point in life) is one in eight, and the lifetime risk of ovarian cancer is one in fifty. 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. The vast majority of cases, 90–95%, just happen by chance, but a small group of cases, 5–10%, occur when someone has inherited an increased risk of developing cancer.

What is inherited breast cancer?
In some families, we see more cases of breast cancer than we would expect to see by chance. We know that in some of these families, the cancer is due to an inherited susceptibility. This inherited susceptibility can be caused by changes (mutations) in genes such as BRCA1, BRCA2, PALB2 and CHEK2 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 inherit one copy from each parent.

The normal function of the genes being tested is to help protect us from developing cancer. We all have two copies of each of these genes as we inherit one copy from each of our parents. Therefore, both men and women have two copies of each gene. A mutation in one copy of a gene causes an increased cancer risk in individuals that carry it.

If someone has a mutation in one copy of a gene, they have a 50% (one in two) chance of passing on the mutation to each child they have, regardless of 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 to be reported.

Additional genetic tests may be suggested to families based on their individual family history of cancer.
What are the possible results of breast cancer susceptibility gene testing?

- **Testing does not find a mutation in one of the breast cancer susceptibility genes**
  If this happens, the chance of a breast cancer susceptibility 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 test to offer relatives who have not had cancer.

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

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

**BRCA1 and BRCA2**
For women with a mutation in the BRCA1 or BRCA2 genes, there is up to a 70% lifetime risk of developing breast cancer and up to a 45% lifetime risk of developing ovarian cancer. For women who have already been affected with breast cancer, we know there can be up to a 65% chance of them developing another breast cancer in the future and this can be influenced by the age of her 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 increased risk of developing prostate cancer and also breast cancer. Men and women with a BRCA2 gene mutation have a small risk of pancreatic cancer of 3%.

**PALB2**
For women with a mutation in PALB2 there is up to a 55% risk of breast cancer. Our knowledge regarding PALB2 is rapidly increasing, and advice could change over time. Increased breast screening with mammography and/or MRI scans is recommended. PALB2 also causes a possible increased risk of pancreatic cancer.

Specific risk figures and screening advice usually depends on family history and should be discussed further with a genetic clinician.

**CHEK2**
Around 4% of families with a strong family history of breast cancer are found to have a common mutation in the CHEK2 gene. Women with a CHEK2 mutation have about a 25% risk of developing breast cancer in the absence of a close relative with breast cancer.

Specific risk figures and screening advice usually depends on family history and should be discussed further with a genetic clinician.
What can I do if I have a mutation?

Women who are carriers of a BRCA gene mutation are eligible to have breast screening from the age of 30. The purpose of this screening is to aid 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, but not all, who are carriers of a BRCA1 or BRCA2 gene mutation may choose to have surgery to reduce their risk of developing a further cancer 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 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 weigh up whether this is the right decision for you. This can be accessed through the BRCA Family Service.

For the other genes in the panel test (such as PALB2 and CHEK2), screening is determined on a case-by-case basis according to current national guidance and the published literature. Specific management options will be discussed with you in your genetic counselling appointment.

What can be done if I decide not to undergo testing?

Not everyone who has been affected by cancer will choose to undergo genetic testing. If you decide not to undergo genetic testing, you and your family members may still be eligible for regular breast screening.

Things to consider

Deciding to have diagnostic genetic testing can be a difficult and complex process. You may wish 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 genetic mutation was identified and how would you share this information within the 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 consider 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 is perhaps best to consider now what the answers may be, so that when you have your result you have an idea of how you may proceed.
Support
Undergoing diagnostic genetic testing and receiving the results can be a challenging time. Some people may wish to talk through their feelings, coping strategies and other issues before making a decision, or after receiving their result. Several avenues of support are available to BRCA carriers, including the following:

- your genetics clinician
- the BRCA Family Service (see below)
- BRCA support groups
- clinical psychologist
- your GP
- cancer charities such as Breast Cancer Care (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.

The BRCA Family Service
BRCA carriers are invited to our BRCA Family Service clinic. There, 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, we will send you your invitation, a leaflet about this service, and a psychological questionnaire with your test result.

Research studies
Regardless of the result of your testing, there may be an opportunity for you to take part in research. Your genetics clinician or a research nurse will discuss this with you. For further information, contact a member of the research team on 020 7188 2603.

Useful sources of information
Breast Cancer Care
UK-wide charity providing care, information and support to people affected by breast cancer.

**t:** 0808 800 6000 (helpline, Monday–Friday 9am-5pm, Saturday 10am–2pm)

**e:** info@breastcancercare.org.uk  
**w:** www.breastcancercare.org.uk

Someone Like Me
Service provided by Breast Cancer Care. 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  
**e:** someoneilikeme@breastcancercare.org.uk

Macmillan Cancer Support
Support and advice charity for people affected by cancer.

**t:** 0808 808 0000 (Monday–Friday, 9am–8pm)  
**w:** www.macmillan.org.uk

For more information leaflets on conditions, procedures, treatments and services offered at our hospitals, please visit www.guysandstthomas.nhs.uk/leaflets
Contact us
If you have any questions or concerns, please contact your genetics clinician on 020 7188 1364 (Monday to Friday, 9am to 5pm).

Cancer Genetics Service
Guy's Regional Genetics Service
Guy's Hospital
Great Maze Pond
London SE1 9RT

Pharmacy Medicines Helpline
If you have any questions or concerns about your medicines, please speak to the clinical nurse specialist or other member of staff caring for you or call our helpline.
\t: 020 7188 8748 9am to 5pm, Monday to Friday

Your comments and concerns
For advice, support or to raise a concern, contact our Patient Advice and Liaison Service (PALS). To make a complaint, contact the complaints department.
\t: 020 7188 8801 (PALS)  e: pals@gstt.nhs.uk
\t: 020 7188 3514 (complaints)  e: complaints2@gstt.nhs.uk

Language and Accessible Support Services
If you need an interpreter or information about your care in a different language or format, please get in touch:  \t: 020 7188 8815  e: languagesupport@gstt.nhs.uk

NHS 111
Offers medical help and advice from fully trained advisers supported by experienced nurses and paramedics. Available over the phone 24 hours a day.\t: 111

NHS Choices
Provides online information and guidance on all aspects of health and healthcare, to help you make choices about your health. \textit{w:} www.nhs.uk