NHS
Birmingham Women's and Children's
NHS Foundation Trust

Information leaflet for women with an increased lifetime risk of breast and ovarian cancer

Hereditary Breast and Ovarian Cancer (HBOC)

By your side

What is Hereditary Breast and Ovarian Cancer (HBOC)?

Hereditary Breast and Ovarian Cancer is a genetic condition which causes women in a family to have an increased risk of developing breast and ovarian cancer. In some families there also may be an increased susceptibility to other cancers, such as male breast cancer, prostate cancer, malignant melanoma and pancreatic cancer.

How do I know if the cancers in my family are due to HBOC?

HBOC is uncommon. Fewer than 1 in 20 women who develop breast cancer have HBOC. In most families cancer is not inherited or passed down through the generations. HBOC might be present in your family if:

- Several women had breast cancer or ovarian cancer
- Someone was diagnosed at a much younger age than is usual
- A relative had breast cancer more than once, or had early breast and ovarian cancer
- A male relative had breast cancer as well as female relatives
- Multiple generations on one side of the family were affected by these cancers

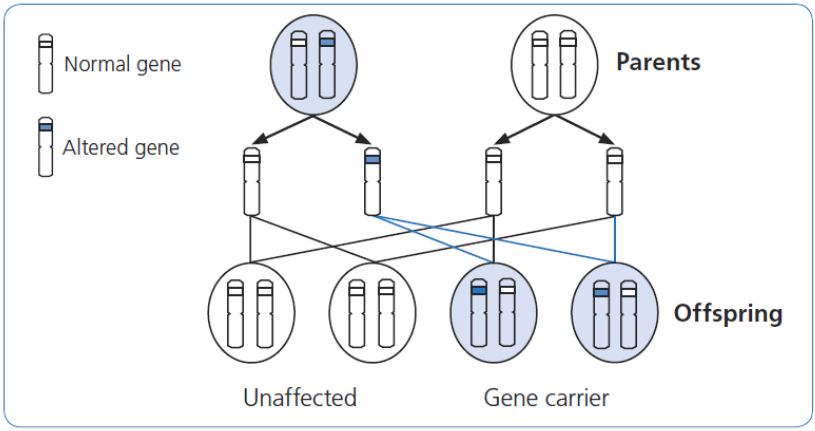
In the UK, breast cancer affects 1 in 8 (12.5%) women during their lifetime. The great majority are diagnosed over the age of 60. Ovarian cancer is less common. About 1 in 50 (2%) women will develop ovarian cancer in their lifetime. Most of them will have been through menopause. Prostate cancer affects about 1 in 8 men (12.5%), but mostly those over the age of 70. The risk of male breast cancer is very small, about 1 in 1000.

How does HBOC run in families?

HBOC is caused by an alteration in a gene. Genes are messages which control the working of the body. Most genes come in matching pairs; one copy of each is inherited from the mother, the other copy from the father, as shown in the diagram.

Only a single genetic alteration is needed to cause HBOC. If someone has HBOC it means they have a normal copy of the gene but they also carry an altered copy. Each time they have a child there is a fifty-fifty (50%) chance that they will pass on the normal copy and a fifty-fifty chance they will pass on the altered one.

Women AND men can carry an altered copy of the gene, so HBOC can be inherited from either parent. Therefore, the father's family history of cancer also matters.



HBOC is more likely in a family if at least three relatives on the same side of the family had early breast or ovarian cancer. However, HBOC might also be diagnosed if an altered gene has already been found in an individual with cancer regardless of their family history.

Which genes cause HBOC?

There are two genes which we know give rise to HBOC. They are called BRCA1 and BRCA2. There may be other important genes which have not yet been discovered. In some populations certain alterations in either BRCA1 or BRCA2 are more frequent than normal. Among others, this applies to those with Ashkenazi Jewish or Eastern European ancestors.

What is the risk of developing breast and ovarian cancer?

A woman who inherits an altered BRCA1 or BRCA2 gene will not always get cancer but her risk of developing breast or ovarian cancer during her lifetime is greatly increased.

For women with a proven alteration in either BRCA1 or BRCA2, the risk of developing breast cancer before the age of 80 is approximately 80%. The risk of ovarian cancer is lower and is different for the two genes. The lifetime risk of ovarian cancer for proven BRCA1 carriers is approximately 40-60%. For BRCA2 carriers the risk is lower, about 15-30%.

These risk figures are only for those who are known to carry an alteration in BRCA1 or BRCA2. If you have not been tested for a gene alteration your risk of cancer is a lot lower. It would depend on how closely related you are to those with cancer.

What about men in HBOC families?

Recent evidence suggests that men with a BRCA1 alteration may have a slightly increased risk of prostate cancer. The risk may be in the region of 15% over their lifetime. Evidence indicates that men with a BRCA2 alteration also have an

increased risk of developing prostate cancer. Their estimated lifetime risk of prostate cancer is higher than that of BRCA1 carriers, in the region of 20-25%. We would suggest men at increased risk consider prostate screening from the age of 45. This involves a blood test to measure their PSA levels. We recommend referral to a Urologist who has special knowledge of these matters.

Men who carry a BRCA2 alteration also have a 6-8% lifetime risk of developing male breast cancer. Currently screening for male breast cancer is not recommended. However we do recommend that men examine their chest area regularly and report any changes to their GP.

Gene tests

Where there is a significant chance that the cancers in a family may be due to HBOC we may offer a genetic test to look for alterations in the BRCA1 and BRCA2 genes. The most useful way of carrying out genetic testing is to start with someone who had a diagnosis of breast or ovarian cancer. However, when there are no affected family members available to test we may consider testing family members with no personal history of cancer.

Before a gene test is carried out they need to carefully discuss it with their Geneticist or Genetic Counsellor. These initial tests usually take about two months to complete. If an alteration is found in someone with cancer it is then possible to offer gene testing to other family members to see if they inherited it. However, not all HBOC families have identifiable genetic alterations. This means we are not able to offer a gene test to all families.

If no genetic alteration is found in your family we would not be able to offer genetic testing to other relatives. However, we would still be able to advise you about cancer screening or risk-reducing surgery. Our advice would be based on your family history.

If a BRCA1 or BRCA2 alteration is identified it would allow other relatives to have a similar test to see if they also carry it. The results of these tests might be difficult to come to terms with. Also, there would be implications for cancer screening. Therefore, we would want to discuss the possible benefits and disadvantages of having a test before going ahead.

If you had a genetic test and were found to carry the gene alteration, we would discuss with you any options for screening and for reducing your risk. Alternatively, if you had a genetic test and it showed you did not to carry the alteration your risk would not be increased and no extra screening would be suggested. However, we would still recommend you have breast screening provided by the NHS National Breast Screening Programme at the appropriate time. If you decide not to have a genetic test we would not be able to confirm your actual risk of breast or ovarian cancer. We would still recommend extra breast screening and discuss risk-reducing surgery if you wish. If other family members or their doctors would like further information or advice we would be pleased to help them.

What can you do if you are at increased risk?

If you are at increased risk of breast and ovarian cancer you have several options. Although you may have a high lifetime risk, your actual risk over the next 10 years will still be low, especially if you are under 30. Depending on your age and personal choices you might want to manage your risk differently to other family members. Women considering risk-

reducing mastectomy may choose to defer surgery until they are entering the age group where the risk is most significant. For younger women there is also the possibility that other treatments may be developed in the next 10-20 years which might provide better alternatives.

Breast screening

Most women will be offered regular mammograms (X-rays of the breast) and a breast examination by a clinician. Sometimes the clinician will decide to use other types of examination including ultrasound scan or MRI of the breast because breast screening is difficult in younger women who tend to have denser breast tissue.

Depending on your personal risk, breast screening might be offered earlier than usual. If you are known to carry a BRCA1 or BRCA2 alteration it would be offered from the age of 30. Mammograms will sometimes detect changes in the breast which are harmless but might require further investigations. It is also important to know that not all cancers will be picked up by screening. You should be 'breast aware' and report any unusual symptoms to your doctor as soon as possible.

Breast screening does not prevent the development of cancer. It is given in the hope of picking up cancer at an early stage where treatment is more likely to succeed. However, it might still involve surgery and possibly chemotherapy and radiotherapy too.

Risk-reducing surgery of the breast

Double mastectomy (removal of both breasts) reduces the risk of breast cancer by at least 90%. However it involves major surgery with a risk of complications. It usually involves breast and plastic surgery teams. It may also have psychological

implications. Counselling would be offered with them and a clinical psychologist.

Subcutaneous mastectomy involves removal of as much breast tissue as possible, including the nipple. There is a risk of interrupting the blood supply to the skin. Therefore, loss of some skin tissue is a recognised complication. An artificial nipple can be reconstructed later.

Simple (total) mastectomy involves removing most of the breast tissue and the skin. Reconstruction can be with an artificial or natural implant. Existing muscle or some fatty tissue can be used as a natural implant.

There are advantages and disadvantages to each procedure. You would be able to discuss these with the surgical team.

Chemoprevention: Using a drug to reduce breast cancer risk

Certain drugs that block the effect of hormones in the body can be used to reduce the risk of breast cancer for those at high risk (and moderately increased risk). This may be an option if you have a strong family history of breast cancer or an alteration to BRCA1 or BRCA2. The evidence for benefit in BRCA1 and BRCA2 carriers is limited as not many people with these gene alterations were involved in the studies of chemoprevention.

The protection may be higher in women with BRCA2 alterations than BRCA1. This needs to be carefully considered for each individual, as there can be slight risks and side effects from taking the drugs. Your genetics doctor or genetic counsellor should discuss this option with you initially, but prescribing and monitoring of the use of these drugs would be managed by your GP or breast team.

Ovarian screening

If you have an increased risk of ovarian cancer we will suggest referring you to a Gynaecologist with expertise in oncology. They will discuss various options with you, such as screening for cancer or risk-reducing surgery.

Depending on your local Gynaecology Service, you may be offered an internal (transvaginal) ultrasound scan every year and a blood test called CA125. This is the only method available at present. Some preliminary findings, from a recent large national study of ovarian screening in high risk women, have shown that screening may detect ovarian cancers at an earlier stage. However, this does not necessarily mean that screening increases the chance of a cure or saves lives – further observations from the study will be needed. Some gynaecologists do not offer screening.

In pre-menopausal women screening is more complicated because normal ovaries produce small cysts each month before ovulation. This may complicate the picture so you might be recalled even if it turns out to be normal. Occasionally further investigations may be needed which can cause anxiety.

CA125 is not a cancer test but can detect changes in the ovaries. These changes might not be cancerous but may need further investigations. If offered, ovarian cancer screening for women who carry an alteration in the BRCA1 or BRCA2 gene usually starts from the age of 35. It is important to remember that ovarian screening is not the same as cervical screening (previously called smear tests) which is done at your GP surgery. It is advisable to consider the alternative option which is having your ovaries and fallopian tubes removed at an appropriate age. You can discuss this with your Gynaecologist on referral.

Risk-reducing surgery of the ovaries (Oophorectomy)

Removal of the ovaries and fallopian tubes reduces the risk of ovarian cancer by more than 90%. In pre-menopausal women it also reduces the risk of breast cancer by at least a third. If performed in pre-menopausal women, oophorectomy causes an immediate menopause. This usually requires Hormone Replacement Therapy (HRT) until the age of natural menopause (around 50 years of age). HRT given in this way will not increase the risk of breast cancer.

The risk of womb cancer and cervical cancer does not appear to be increased in BRCA1 and BRCA2 carriers. Therefore, a full hysterectomy is not required unless you have other unrelated gynaecological problems. You might be offered keyhole surgery to remove your ovaries and tubes. You can get further advice about this from your Gynaecologist.

Does my risk change with age?

An individual who has not had a gene test or breast/ovarian cancer has a gradually decreasing chance of carrying the altered gene as they get older. This also means the risk to their children declines. This may become clearer by the time the next generation reaches the age when cancer screening would usually start.

Are there any symptoms I should look out for?

Diagnosing ovarian cancer can be difficult because symptoms are often similar to those caused by less serious common conditions. If you have any of the following symptoms it is unlikely they are due to a serious problem. It is still important that you discuss them with your doctor.

Ask them if they have considered ovarian cancer. In particular, you should ask your GP about ovarian cancer if you experience any of these three symptoms on most days:

- Persistent pelvic and stomach pain
- Increased abdominal size/persistent bloating - not bloating that comes and goes
- Difficulty eating and feeling full quickly

In most women, breast cancer is first noticed as a painless lump in the breast.

Other signs may include:

- A change in the size or shape of a breast
- Dimpling of the skin of the breast
- A thickening in the breast tissue
- A nipple becoming inverted (turned in)
- A lump or thickening behind the nipple
- A rash (like eczema) affecting the nipple
- A bloodstained discharge from the nipple (this is very rare)
- A swelling or lump in the armpit

Pain in the breast is not usually a symptom of breast cancer. In fact many healthy women feel that their breasts feel lumpy and quite tender before a period. Some types of benign breast lumps can be painful. Often there are no outward signs of breast cancer that you can see or feel. Even if you do have one or more of these signs, it still doesn't mean you have breast cancer. Most breast lumps turn out to be benign (not cancerous).

However, it is important that you tell your doctor immediately if you experience any worrying symptoms. Having your doctor take a look may ease your worry, and if anything is found, you'll be able to take care of it quickly.

Useful websites (www):	Telephone numbers:
http://breastcancernow.org	Breast cancer now. 0333 20 70 300
breastcancergenetics.co.uk	Hereditary Breast Cancer Helpline: 01629 813 000
breastcancercare.org.uk	Breast Cancer Care: 0808 800 6000
macmillan.org.uk	Macmillan Cancer Support: 0808 808 0000
ovacome.org.uk	Ovacome Support Service: 0800 008 7054
cancerhelpuk.org	CancerHelp UK (Nurse Line): 0808 800 4040

If you need more advice please contact:

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