



# I have ovarian cancer

Everything you need to know  
about BRCA1/2 gene mutations

(NHS England only)

# An introduction to BRCA1/2 gene mutations

BRCA1 and BRCA2 are genes that repair damage in cells and prevent them from growing and dividing too rapidly. All of us have two copies of these genes. Mutations in these genes can cause cells to become abnormal and grow in an uncontrolled way.

Having a mutation in one of these genes can increase a woman's risk of both breast and ovarian cancer. This can mean that a woman has an 80% chance of developing breast cancer in her lifetime and a 35-60% chance of developing ovarian

cancer in her lifetime.

For men, a BRCA2 mutation increases the risk of developing prostate cancer and the BRCA1/2 gene mutations have also been linked to pancreatic cancer and melanoma in both men and women.

Those from Ashkenazi Jewish, Dutch, Icelandic, Norwegian, Pakistani, Polish and Swedish populations are more likely to have a BRCA1/2 gene mutation than some other populations.

## Should I get tested?

Knowing your BRCA status can affect your treatment pathway. Testing for a BRCA1/2 gene mutation also provides a significant opportunity for preventing future cases of cancer, for both you and your family members, through options including risk-reducing surgery and increased surveillance.

Such options could reduce the number of cases of ovarian cancer by around 17%. That amounts to a potential 1,000 cases per year.

BRCA1/2 gene mutations are genetic, so if you are a carrier then there is a chance that other members of your

family are too. If you test positive for a BRCA1/2 gene mutation you can tell other members of your family that they may be at risk, giving them the option to get tested themselves if they wish. Those with a BRCA1/2 gene mutation have a 50% chance of passing the mutation on to their children.

Everyone has the right to choose whether or not to be tested and it's not a decision to be taken lightly. Genetic counselling can be provided if you're thought to be at risk, to help you make this decision.

# How do I get tested?

If you have a **high-grade serous epithelial carcinoma** you are automatically eligible for BRCA1/2 genetic testing. This is because a high-grade serous epithelial carcinoma diagnosis automatically puts you over the significant risk threshold.

In all other cases, NHS England says genetic testing will be offered to a person with breast or ovarian cancer if their combined BRCA1 and BRCA2 gene mutation carrier probability is 10% or more. If they haven't already talked to you about it, you can ask your cancer team about testing. Together you will decide whether you are to be referred to a genetics centre or offered a BRCA1/2 genetic test.

A referral to a genetics centre may not be needed if you are being cared for in hospitals that offer BRCA1/2 genetic testing as part of your cancer care. At

the time of writing, hospitals that offer this include Hammersmith Hospital, the Royal Marsden (through the Mainstreaming Cancer Genetics Initiative), the Christie and Addenbrookes. In these hospitals you may be asked whether or not you would like to have a BRCA1/2 genetic test by a nurse, doctor or other healthcare professional.

If you are to be BRCA1/2 genetic tested, **NICE guideline CG164 1.5.2** recommends pre-test counselling. This allows you the opportunity to discuss the potential risk and benefits of BRCA1/2 genetic testing, the chances of finding a mutation, the implications for you and your family, and the different types of test results. You should also have the chance to ask questions to help you make the decision about whether or not you wish to have BRCA1/2 gene testing.

# Interpreting your test results: What's next?

## What if my test is inconclusive?

BRCA 1/2 genetic testing does not always give a clear yes/no answer. Many different mutations have been identified in BRCA1/2 genes but not all have been linked with an increased risk of cancer. These mutations are known as 'variants of uncertain significance' (VUS). Identifying a VUS means that an abnormality has been found in your BRCA1/2 gene test, but that based on available information, the specific mutation found has not been linked to an increased risk of developing cancer. As we learn more about variants of uncertain significance some might be re-classified as being 'clinically

significant' and hence associated with an increased risk of developing cancer. This information is constantly being updated according to **NICE clinical guideline CG164 1.5.10**. If your test results show a VUS then **NICE clinical guideline CG164 1.5.9** advises that you can request a review in the future to see whether your VUS has been classified as a BRCA1/2 gene mutation.

## A positive test result

If you have tested positive for a BRCA1/2 mutation you will also have a higher risk of developing some other cancers, as per the table below. Read on to find out more about what a positive result means for you.

Estimated Cancer Risk by Age 70			
Type of Cancer	Normal risk	BRCA1 Risk	BRCA2 Risk
Ovarian cancer	2%	40-60%	10-20%
Breast cancer in women	11%	60-85%	45-60%
Breast Cancer in men	0.1%	Up to 3%	Up to 12%
Pancreatic cancer	1.3%	3-4%	7%

# How your BRCA1/2 status affects your treatment

It's useful for your oncology team to know if you have a BRCA1/2 gene mutation so they can take it into account when considering options for your treatment and/or clinical trials.

Currently women with a BRCA1/2 gene mutation are given the same chemotherapy treatment as women without a genetic predisposition and, in some cases, this treatment can be more beneficial to carriers of a BRCA1/2 gene mutation.

For example, BRCA1/2 gene mutation carriers with ovarian cancer receiving standard platinum treatments have higher response rates and longer times to relapse than women with non-hereditary ovarian cancer.

Studies are currently researching how BRCA1/2 gene mutation related tumours respond to both standard treatments and to new agents, which are designed specifically to target the BRCA1/2-mutated cancer cells.

In 2016, a drug called Olaparib was approved for women with a BRCA1/2 gene mutation facing a second recurrence of ovarian cancer. This new class of drug, known as a PARP inhibitor, can delay the progression of the disease by up to two years.

## Clinical trials

Once standard treatments have been tried it's possible that your oncologist will recommend you for a clinical trial. It is also possible that there may be a clinical trial available which is specifically tailored to women with a BRCA1/2 gene mutation.

It is important to note that availability of these trials is patchy so you will need to discuss options with your oncologist.

You can also look online for current trials at:

[www.cancerhelp.org.uk/trials](http://www.cancerhelp.org.uk/trials)

[www.cancer.gov/clinicaltrials](http://www.cancer.gov/clinicaltrials)

# Telling your family

Telling your family that you have a BRCA1/2 gene mutation may seem daunting. Just remember that you have options, and support is available.

## Telling your children

1. You can delay telling your children until you feel they are old enough. The benefit of this is that it doesn't cause them any distress at an age when you may feel it is too much for them to handle or understand.

2. You can tell them at a young age. The benefit of this is that they have time to come to terms with their possible risk and you can start having discussions early on about some of the difficult decisions they may have to make.

There is no right or wrong time to tell your children. You'll want to discuss this with someone close to you, and with your genetics team, to help you to decide which would be the best option for your family.

Given that the cancers attributed to the BRCA1/2 gene mutations don't usually arise until people are in their 20s or 30s (or later), the testing of young children is not usually available, as action can't be taken until they are over 18. It is also generally better if children can be involved in discussions about their own genetic testing, and

this is not possible for very young children. Teenagers may benefit from a discussion with a genetics team, even if testing is not carried out until they are 18.

## Telling your extended family

Your genetics team will help you identify which of your extended family may also have inherited the mutation. This will depend on what side of the family – your father's or mother's – the gene was passed down from.

Once this is established, your brothers, sisters, aunts, uncles and cousins on that side of the family will be known to be at risk of having inherited the mutation. While it is recommended that they are informed, there are currently no official procedures to assist with this and the responsibility and decision to tell them lies with you.

If you don't feel comfortable having this discussion with your family members, your genetics clinic can help with this. For example, they may be able to give you information to pass on. This will explain that a family member has an inherited genetic mutation and will describe what this might mean to them and how they can obtain a referral to their nearest genetics clinic for genetic counselling and testing.

# The real impact of BRCA1/2 testing: The patient view



Angela Walker found out she had a BRCA1/2 gene mutation after her ovarian cancer diagnosis.

*“Knowing I had the BRCA2 gene mutation helped me greatly because my children were little. It means we know what to look for in my daughter and she can be monitored in the future.”*

Annie Chillingworth says that knowing her BRCA1/2 status was useful for her whole family. *“My siblings and cousins are all taking measures to protect themselves. It puts them in a strong position of control. My daughter does not have the mutation so she’s able to move on from the anxiety of not knowing.”*



Niki Orchard has a BRCA1/2 mutation and had preventative surgery after losing her mother to cancer.

*“Knowledge is power and each individual person can choose what to do with that knowledge.”*

Caroline Presho is BRCA2 positive and has opted for risk reducing surgery. *“I felt vulnerable not knowing my BRCA status, given my family history of cancer, and I couldn’t live with the worry and anxiety. After the surgery I felt happy and relieved that I have taken away another risk for breast and ovarian cancer.”*



# References & resources

[A Beginners Guide to BRCA1 and BRCA2, The Royal Marsden NHS Foundation Trust, 2013](#)

[Clinical Commissioning Policy: Genetic Testing for BRCA1 and BRCA2 Mutations, NHS England, 2015](#)

[Ovarian cancer: recognition and initial management, NICE, 2011](#)

[Familial breast cancer: classification, care and managing breast cancer related risks in people with a family history of breast cancer, NICE, 2013](#)

Additional content supplied by Clinical Genetics department at Great Ormond Street Hospital. January 2016

Additional content gathered from Ovarian Cancer Action's acting on BRCA event. November 2015. <http://ovarian.org.uk/news-and-campaigning/blog/brca-lecture-right-to-know-impact-on-family>

Additional content supplied by Leela Barham, Independent Health Economist. October 2015.

For more information about ovarian cancer visit [www.ovarian.org.uk](http://www.ovarian.org.uk)

For more information about breast cancer visit [www.breastcancernow.org.uk](http://www.breastcancernow.org.uk)

For further information about BRCA1/2 genetic testing and the other work undertaken by Ovarian Cancer Action, please contact Ross Little at:

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