What is BRCA1?

May 15 2013, by Geoff Lindeman

American actress Angelina Jolie has had a double mastectomy because she carries the faulty gene BRCA1. Credit: EPA/FACUNDO ARRIZABALAGA

Actress Angelina Jolie has today written an op-ed in the New York Times explaining that she has opted to have a double mastectomy because she carries the hereditary BRCA1 gene, which she says increases her risk of breast cancer by 87%. Her mother died from cancer after a ten-year struggle at the age of 56.

We asked an expert in breast cancer and genetics to explain more about the breast cancer genetic mutation and what it means for women.

What are the BRCA1 (and BRCA2) gene mutations?

BRCA1 and BRCA2 are genes that have been linked to hereditary breast and ovarian cancer. Women who inherit one of these faulty genes are at an increased risk of breast or ovarian cancer. Men who inherit a faulty gene may be at increased risk of prostate cancer. Breast cancer in men carrying BRCA2 has also been described in the medical literature.

These genes are important in helping repair breaks in the DNA in our cells, so a faulty gene can mean that DNA repair is less than optimal. In some people this can lead to the development of cancer.

Should I be getting tested for them?

Not routinely. In general terms, genetic testing should be carried out following counselling in a familial cancer centre after a proper assessment of risk.

Testing is offered to people who have developed breast or ovarian cancer where there are features that might suggest a mutation is present.

These can include an early age of onset of cancer, or cancer in both breasts, multiple cancers in the family, male breast cancer, ovarian cancer, certain ancestry (such eastern European Jewish ancestry), or where there is a known mutation in the family.

Sometimes the appearance of a tumour, reported by the pathologist can help make a decision regarding whether testing is necessary.

How are they tested for?

This is generally done through a blood sample.

What is the cost of the test/s and why?

At present testing for these genes in Australia is expensive – about A$2,000 to A$2,500 – but costs are coming down.

Once a mutation has been identified in a family member, other members can be tested and this is much cheaper.

In Australia, the test is offered for free in familial cancer centres where a person meets suitable criteria for testing.

How many people are affected?

About 5% of all breast cancers are hereditary, and can involve the BRCA1 or BRCA2 gene. That is why it is important to look for special features that suggest risk.

In our community the risk of carrying a gene is relatively rare at about 1:800 for each of the mutations.

Say I have the gene/s, what is the likelihood that I will develop (a) breast cancer and (b) ovarian cancer?

Having the gene does not mean that a woman will definitely develop either of the cancers.

The risk is believed to be on average somewhere between 40% and 65% for breast and 15% to 40% for ovary, depending on the gene.

In her op-ed, Angelina Jolie said her risk of developing breast cancer was 87% and that she had a 50% risk of developing ovarian cancer. This is because the risk for BRCA1 carriers can be higher than for BRCA2 carriers.

Jolie has reported the upper end of risk for breast cancer that was first described when the gene was discovered. Looking at the general population, the risk is probably less, but for some families with very striking family histories, it could be this high.

What are the treatment options?

If a cancer develops, it is often treated in a very similar fashion to other breast or ovarian cancers.

For breast cancer, sometimes women might consider more extensive surgery (such as mastectomies). There are new drugs called PARP inhibitors that are being developed tested for BRCA-associated cancers.

What are the prevention options?

There are a number of options. For breast cancer, this includes close monitoring which includes MRI scans and mammograms starting at a suitable age.

Breast cancer prevention drugs such as Tamoxifen are likely to be helpful and may even halve the risk of getting breast cancer.

Some women may consider mastectomy with breast reconstruction. The uptake of this option differs; on average about 20% of women carrying the genes take this option in Australia but the precise numbers are not known.

Importantly, due to the potential risk of ovarian cancer some women will be advised to have their fallopian tubes and ovaries removed at a suitable age (and after they have had children).

If this is carried out at age 40, it can halve breast cancer risk. It is known to be safe to give women hormone replacement therapy in most cases, so that they don't experience menopausal symptoms.

What are the side-effects of mastectomies, if any?

These are generally minimal. In the short term, there can be surgical risks of infection and bleeding and, of course, cosmetic results (breast reconstruction) may differ.

What are the chances of survival for preventative measures vs treatment options?

The chances of survival for preventative measures are excellent and the risk of breast cancer is very substantially reduced. Since screening can detect cancer early, this helps improve outcomes.

Treatment for breast cancer has substantially improved over the last two decades, including for BRCA1 and BRCA2-associated cancers, so with proper treatment of early cancers, the outlook can be very good.

Source: The Conversation