Universitair Ziekenhuis Brussel

Oncologisch Centrum
Behandeling en Onderzoek van Kanker

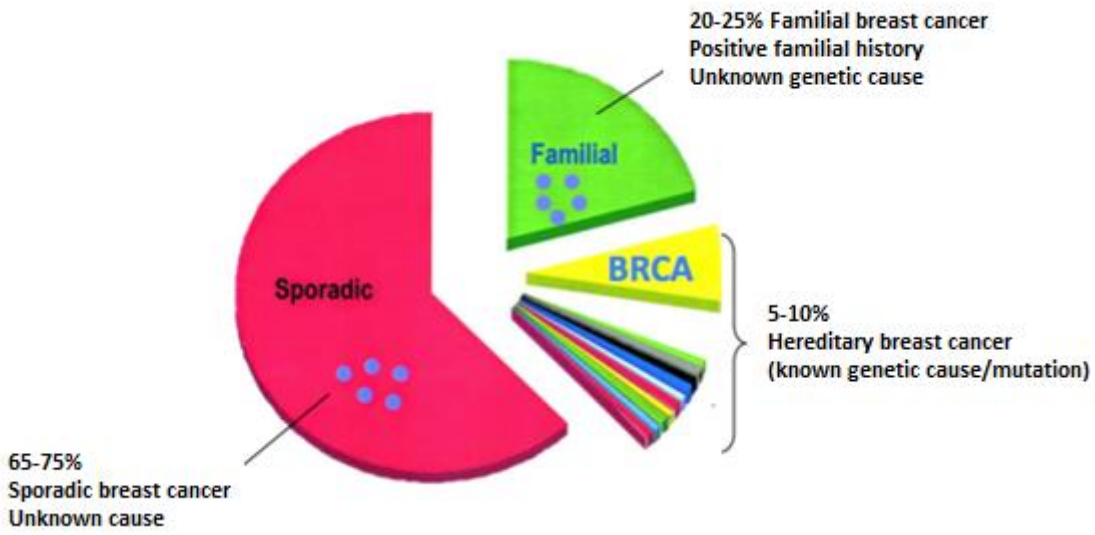
Centrum voor Medische Genetica

Hereditary breast and ovarian cancer

Information leaflet for patients

INTRODUCTION

Breast cancer is one of the most common cancers in women. Western women have a 1 in 8 (13%) risk of developing breast cancer during their lifetime. The risk of ovarian cancer is much lower at 1 in 70 (1.5%). The older one gets, the more likely one is to develop cancer, since the risk of abnormalities in cells increases with age. Usually, breast cancer occurs between the ages of 50 and 70. However, in about a quarter of women, breast cancer occurs before the age of 50.



About 30% of all women with breast cancer have a family history (= presence of other women with breast cancer in the family). In 20-25% of cases, no genetic defect (mutation) is found. In such a case we speak of a **familial cancer**. In 5-10% of patients there is a genetic defect and this is called **hereditary cancer**.

FEATURES OF HEREDITARY BREAST AND OVARIAN CANCER

The more of the following characteristics are present, the more likely it becomes that an inherited predisposition is present:

- Breast or ovarian cancer in multiple first and second-degree relatives (e.g. mother, daughter, grandmother ...)
- Breast cancer at a young age, i.e. under 40 years of age
- Breast cancer in both breasts
- Presence of both breast and ovarian cancer in a patient
- Breast cancer in a man in the family
- Triple negative breast cancer (hormone insensitive breast cancer)

In Belgium, guidelines are used to determine whether someone is eligible for genetic testing (available on the site: www.college-genetics.be). You can of course also talk to your own doctor about this.

WHAT DOES A HEREDITARY PREDISPOSITION FOR CANCER MEAN?

Our body is made up of billions of cells. At the core of these cells is our hereditary or genetic material organized in the form of chromosomes.

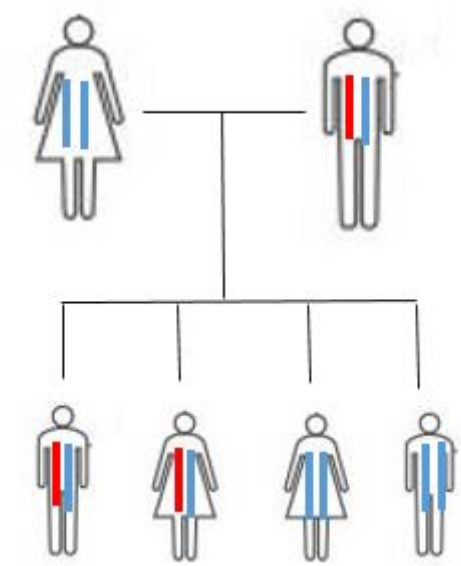
Each of us has 46 chromosomes in each cell. Half of these (23 chromosomes) come from the father and the other half from the mother. On these chromosomes our genetic code is stored in the form of DNA (deoxyribonucleic acid). Each DNA strand consists of millions of building blocks (A, G, T and C) arranged in a particular order called the "sequence". Thus, a gene is a specific DNA sequence that contains the code to form a particular protein. Humans have about 20,000 genes. These genes can be read and contain information that makes us unique as individuals. Of most genes, humans have two, one originating from the mother and one from the father.

During cell division our genetic material, DNA, must be doubled in order to be distributed between two daughter cells. During this process, errors (for example, a change in the order of the building blocks) can occur in the genes and this is called a mutation. Many mutations are harmless because they occur only in a few body cells or because they do not disrupt the hereditary code (function of a protein). Some mutations do have far-reaching consequences (for example, a protein that does not work properly) and then they can lead to the development of cancer.

If someone is a carrier of a mutation, we mean that the defect is present in all body cells. This defect is called a germline mutation, that can be passed on to the children.

INHERITANCE OF MUTATIONS (GENETIC DEFECTS)

If a parent carries an inherited predisposition (the red bar in the father in this figure) for breast or ovarian cancer then each child (whether boy or girl), has a 50% chance of inheriting this predisposition. So there is an equal chance that the children will not inherit the predisposition.



GENES WITH AN INCREASED RISK FOR BREAST AND OVARIAN CANCER

Two hereditary factors, the BRCA1 and BRCA2 genes, are the main cause of a hereditary predisposition to breast and ovarian cancer. Mutations in the DNA code of these genes result in high cancer risks: 60-80% for breast cancer, and for ovarian cancer ~40% for BRCA1 and ~20% for BRCA2.

The other risk genes (such as CHEK2) generally give a somewhat lower risk of breast cancer than the BRCA genes. In addition, these other genes are mostly related to breast cancer and not so much to other tumours. In exceptional situations, a mutation in other, rare high-risk genes (such as PTEN and TP53), can also be the cause of hereditary breast cancer. In these situations, other tumours in addition to breast cancer often occur in a person or in his or her family.

The standard genetic testing currently performed, when a hereditary predisposition to breast or ovarian cancer is suspected, includes 12 genes. These are currently: BRCA1, BRCA2, CHEK2, ATM, PALB2, TP53, RAD51C, RAD51D, BRIP1, MLH1, MSH2 and MSH6.

The cancer risk associated with each of these genes may however differ, and some are also associated with an increased risk of other cancers (for example BRCA2 increases the risk of prostate cancer in men). The geneticist or oncologist (cancer specialist) at the family cancer consultation will explain the mutation found and the risks associated with it. This information is important to know in order to take precautions.

If you have an increased risk for breast or ovarian cancer, due to a hereditary predisposition, there are two options:

- An intensive follow-up schedule using investigations (MRI = magnetic resonance, mammo-/echography) to early detect breast and ovarian cancer
- Preventive removal of the breasts and/or fallopian tubes and ovaries to reduce the risk of cancer by more than 95%.

If no mutation is found and there is still an obvious family burden, an appropriate follow-up is also indicated. Your treating physician will draw up this plan with you. Nevertheless, with the current scientific knowledge it is not yet possible to detect every possible hereditary predisposition.

BENEFITS OF GENETIC TESTING

- Better medical follow-up and preventive options
- Information about the risks to other family members
- The possibility of not passing on the risk to future children through pre-implantation genetic testing (PGT, see https://www.uzbrussel.be/web/pgt-clinic/about-pgt-embryo-testing).
- The possibility of better oncological treatment (for example, in patients with hormone insensitive breast cancer (triple negative), in the presence of a BRCA mutation, the intensity of chemotherapeutic treatment can be reduced).

COST OF A GENETIC TEST

The mutual insurance company reimburses most of the cost of genetic testing. As a patient, you pay a limited remittance (between 8 and 15 euros).

GENETIC TESTING AND INSURANCE

An insurance agency has no right to oblige you to take a genetic test to purchase life insurance. You never have to report to the insurance company that you have had a genetic test. On the other hand, if you also have or have had a disease, you do need to report it.

For more information: Law on patient rights (RD 22/08/2002) in Belgisch Staatsblad 26/09/2002, Article 95.

CONTACT INFORMATION

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