

The information presented below will help you to weigh the benefits and harms of mammography screening for the early detection of breast cancer. The information and numbers are based on the best scientific evidence currently available. The information materials were developed by the Harding Center for Risk Literacy.

What is breast cancer?

Breast cancer develops when abnormal cells multiply in an uncontrolled manner and gradually turn into lumps or growths in the breast tissue. Cancer cells can infiltrate healthy tissue and metastasize (spread). Factors such as age, family history, and hormonal influences can affect the development of breast cancer. It is assumed that about 8 out of 100 cases of breast cancer are hereditary and can be traced back to the so-called “breast cancer genes” BRCA1 and BRCA2². Breast cancer is the most common cancer affecting women in Germany, with about 70,000 new cases each year³.

What is the purpose of early detection screening by mammography?

In general, the purpose of early detection screening programs is to detect disease in people who do not currently show any signs or symptoms. Detecting and treating disease early can increase chances of recovery, reduce the need for more invasive treatments, and improve quality of life after diagnosis. For breast cancer early detection, screening is performed with a mammography. A mammography involves an X-ray examination of the breast in which two X-rays are taken from different angles. These X-rays are each assessed independently by two doctors for signs of abnormalities that may be cancerous⁴.

Who might consider mammography screening?

In Germany, women aged between 50 and 69 years can participate in mammography screening every two years. Mammography screening is an organized screening program where women are personally invited by letter to attend every two years. Mammography screening is paid for by German health insurance funds.

What does the evidence say?

The numbers presented below were calculated from eight studies that compared women who did or did not participate in mammography screening. In total, these studies included a total of about 600,000 participants¹.

The numbers are rounded and each outcome is presented for a group of 1,000 women who did or 1,000 women who did not participate in early detection screening.

Early detection of breast cancer

by mammography screening

The numbers below refer to women aged 50 years and older* who either did or did not participate in mammography screening for approximately 11 years.

	1,000 women who <u>did not</u> participate in mammography screening	1,000 women who participated in mammography screening
Benefits		
How many women died from breast cancer?	5	4
How many women died of any type of cancer?	22	22
Harms		
How many women experienced a false alarm (false positive test result) and had to undergo additional test or have tissue removed (biopsy) to check the result?	-	100
How many women with non-progressive breast cancer had partial or complete removal of a breast (unnecessary treatment)?	-	5

*A few of the studies looked at women aged 40 years and older; these data are also included.

Short summary: Mammography screening reduced the number of women who died from breast cancer by 1 out of every 1,000 women. However, it had no effect on the number of women who died of any type of cancer. Among all women taking part in screening, some women with non-progressive cancer were overdiagnosed and received unnecessary treatment.

Source: [1] Gøtzsche & Jørgensen. Cochrane Database Syst Rev 2013(6):CD001877.

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What do the numbers mean?

The table can be read as follows:

Out of 1,000 women aged 50 years or older who did not participate in mammography screening for a time period of approximately 11 years, 5 died from breast cancer. For women who did participate in mammography screening, 4 out of 1,000 women died from breast cancer.

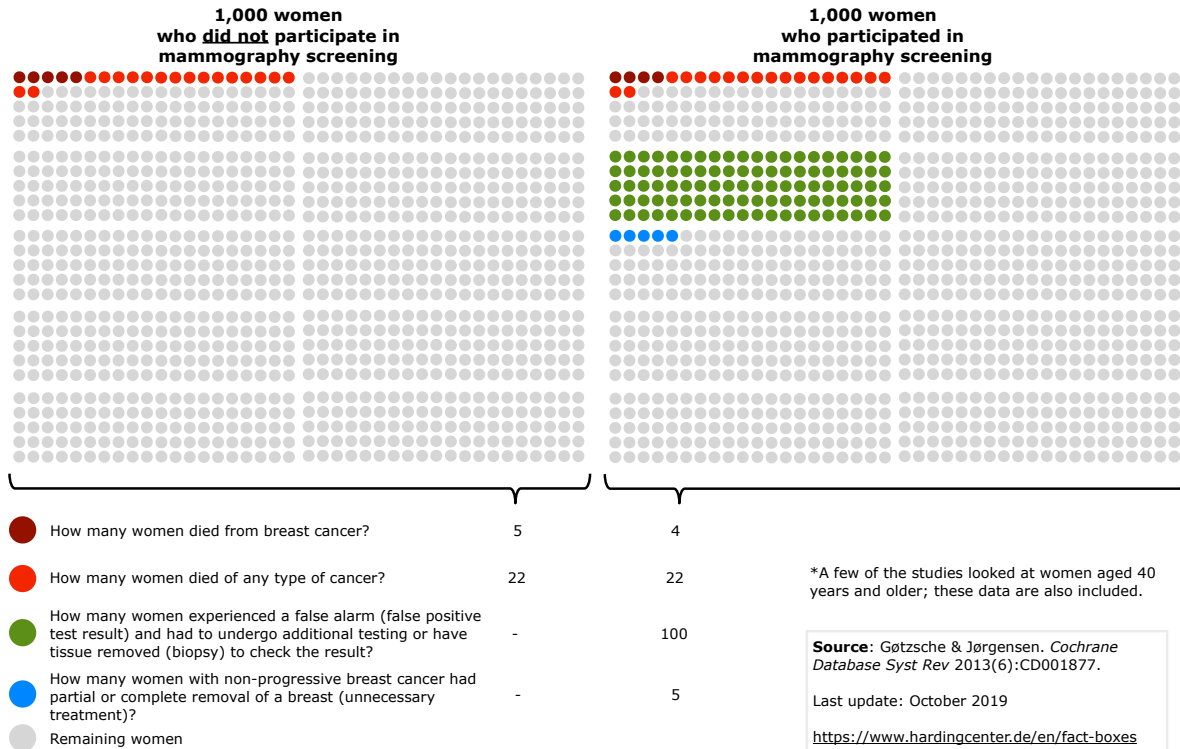
Therefore, regular participation in mammography screening saved 1 out of 1,000 women from dying from breast cancer.

The numbers also show that 22 out of 1,000 women in both groups died from any cancer. This means that mammography screening did not prevent death from any type of cancer; rather, the same number of women died from cancer in each group, but there was 1 fewer death attributed to breast cancer.

In addition, as a result of participating in early detection screening, 100 out of 1,000 women received a false alarm test result and had to undergo additional testing or have a biopsy to check the result and 5 out of 1,000 women received treatment for a non-progressive cancer and had a partial or complete breast removal. Women who did not participate in mammography screening did not experience this outcome.

Early detection of breast cancer by mammography screening

The numbers below refer to women aged 50 years and older* who either did or did not participate in mammography screening for approximately 11 years.



What does it mean to get a false positive test result?

A positive result from a mammography does not automatically mean that a woman has cancer. Mammography screening also detects preliminary stages of breast cancer, such as ductal carcinoma in situ (DCIS), which is characterized by abnormal cells in the mammary ducts that have not spread to other tissue (non-invasive). In some women DCIS remains harmless; in others it develops into an invasive tumor, which can be life-threatening⁴.

Furthermore, women who receive false alarms (positive test results that turn out to be false positives) can suffer from psychological distress, including anxiety and uncertainty, for years afterward¹.

What is overdiagnosis and overtreatment?

Any screening can lead to overdiagnosis. In the case of breast cancer, this means that women are diagnosed with breast cancers that would have remained undetected if they did not participate in screening. For instance, screening may detect small tumors that grow slowly or not at all (non-progressive cancer) and might never have caused any harm. As it is difficult for physicians to assess whether a tumor will continue to grow or not, they often advise their patients to receive treatment. Overdiagnosis often leads to overtreatment, such as undergoing unnecessary surgery or radiation treatments⁴.

How good is the evidence?

Overall, the evidence is of moderate to high quality: Where the quality of evidence is moderate, further research is likely to have an important impact on some findings; where the quality of the evidence is high, the findings are very unlikely to be changed over the course of further research⁵.

Do the numbers differ from other information sources?

The numbers in this information sheet differ slightly from those presented in the invitation letter and decision aid for mammography screening developed on behalf of the Federal Joint Committee (a decision-making body of the joint self-government of physicians, dentists, hospitals, and health insurance funds in Germany) and the German Institute for Quality and Efficiency in Health Care (IQWiG)⁴.

In their decision aid, data is presented for women aged 50 to 69 who regularly participate in mammography screening for a time period of 20 years. Regularly participating in screening is said to save 2 to 6 out of every 1,000 women from dying from breast cancer⁴. However, most studies that have been conducted so far have only observed participants for approximately 11 years, and no study data are available for the time frame of 20 years⁴. Therefore, the numbers in the invitation letter are based on estimates and projections rather than on actual outcomes.

What alternative options are there to detect breast cancer early?

Alternative early detection procedures include ultrasound (sonography) and magnetic resonance imaging (MRI) of the breast. The benefits of these alternative screening procedures are unclear, and it is not known at this stage whether they help to lower the risk of dying from breast cancer⁴.

Sources

Information within the fact box was obtained from the following sources:

[1] Gøtzsche PC, Jørgensen KJ. Screening for breast cancer with mammography. Cochrane Database Syst Rev 2013(6)

[2] Deutsches Krebsforschungszentrum. Familiärer Brust und Eierstockkrebs 2018. [www.krebsinformationsdienst.de/wegweiser/iblatte/iblatte-familiaerer-brust-u-eierstockkrebs.pdf] Accessed 01.10.2019.

[3] Robert Koch-Institut. Krebs in Deutschland 2011/2012 2015. Accessed 27.09.2019. [www.gekid.de/Doc/krebs_in_deutschland.2015.pdf]

[4] IQWiG. Einladungsschreiben und Entscheidungshilfe zum Mammographie-Screening 2014. [www.iqwig.de/de/projekte-ergebnisse/projekte/gesundheitsinformation/p14-03-einladungsschreiben-und-entscheidungshilfe-zum-mammographie-screening.6270.html] Accessed 15.09.2019.

[5] Fitzpatrick-Lewis D, Hodgson N, Ciliska D, et al. Breast cancer screening 2011. Accessed 01.10.2019. [https://canadiantaskforce.ca/wp-content/uploads/2011/11/2011-breast-cancer-systematic-review-en.pdf]