

IARC Handbooks of Cancer Prevention:

Benefits of mammography screening outweigh adverse effects for women aged 50–69 years

Lyon, France, 3 June 2015 – A group of 29 independent international experts from 16 countries, convened by the International Agency for Research on Cancer (IARC), has assessed the cancer-preventive and adverse effects of various methods of screening for breast cancer.

A summary of the results, published today in the *New England Journal of Medicine*, provides an important update of the landmark 2002 IARC Handbook on Breast Cancer Screening in light of recent improvements in treatment outcomes for late-stage breast cancer and new data on screening practices and their outcomes. The Working Group also considered emerging technologies, clinical breast examination, and breast self-examination.

Breast cancer screening and mammography

After reviewing all published peer-reviewed scientific literature, the experts concluded that there is sufficient evidence that mammography screening is effective in reducing breast cancer mortality for women aged 50–69 years, and that the benefit of reduced mortality extends to women screened at age 70–74 years.

An evaluation of data from about 20 cohort and 20 case–control studies conducted in high-income countries (in Australia, Europe, and North America) showed that women 50–69 years of age who attended mammography screening had a reduction in breast cancer mortality of around 40%. Several studies showed that mammography screening of women aged 70–74 years also results in an important reduction in their breast cancer mortality.

Evidence for the effectiveness of screening women in the younger age group of 40–49 years was considered [limited](#).

Adverse effects of mammography

The most important harms of early detection of breast cancer by mammography screening are false-positive results, overdiagnosis, and radiation-induced breast cancer.

Regarding adverse effects, the Working Group came to the following conclusions:

- There is sufficient evidence that mammography screening detects breast cancers that would never have been diagnosed or caused harm if the women had not been screened.
- There is sufficient evidence that having a false-positive mammogram has short-term negative psychological consequences.
- There is sufficient evidence of an increased risk of radiation-induced breast cancer from mammography screening in women aged 50 years or older; however, this risk is substantially outweighed by the reduction in breast cancer mortality.

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“Careful consideration of both the benefits and harms of mammography screening shows a net benefit from inviting women 50–69 years old”, says Dr Lauby-Secretan, an IARC scientist and the Responsible Officer for the Handbooks Series. “The significant reduction in breast cancer mortality observed in this age group outweighs the effects of overdiagnosis and other adverse effects.”

Breast cancer screening by physical examination

Breast cancer screening by physical examination (clinical breast examination or breast self-examination) is relatively simple and inexpensive. Evaluation of the current literature showed that there is sufficient evidence that clinical breast examination is associated with the detection of smaller and earlier-stage tumours. However, no data were yet available for an evaluation of the effect of this screening technique on breast cancer mortality.

For breast self-examination, most studies did not show a reduction in breast cancer mortality.

Numerous studies have investigated the beneficial effects of screening modalities other than mammography. However, none of the emerging technologies, either in addition to or as a replacement for mammography, had sufficient evidence of a reduction in breast cancer mortality.

Global burden

Breast cancer is the most common cause of death from cancer in women worldwide,^{1,2} the second leading cause of death from cancer in women in high-income countries, and the leading cause of death from cancer in low- and middle-income countries, where a high proportion of women present with advanced disease, which has a poor prognosis.³

Established risk factors for breast cancer include age, a family or personal history of breast cancer or pre-cancerous lesions, genetic predisposition, reproductive factors, hormonal treatment, alcohol consumption, obesity (for postmenopausal breast cancer only), and exposure to ionizing radiation.⁴

“Providing early access to effective diagnosis and treatment in developed and developing countries is critical to reduce breast cancer mortality globally”, says Dr Christopher Wild, Director of IARC. “The IARC Handbook on breast cancer screening provides the most up-to-date and extensive evaluation of the scientific evidence. This provides a foundation on the basis of which governments and stakeholders can implement the best intervention strategies in order to save more lives.”

Notes to the Editors:

These assessments will be published as [IARC Handbook of Cancer Prevention Volume 15](#).

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The International Agency for Research on Cancer (IARC) is part of the World Health Organization. Its mission is to coordinate and conduct research on the causes of human cancer, the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control. The Agency is involved in both

1 Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, et al. (2013). GLOBOCAN 2012 v1.0, Estimated cancer incidence, mortality, and prevalence worldwide in 2012: IARC CancerBase No.11 [Internet]. Lyon, France: IARC. Available from: <http://globocan.iarc.fr/default.aspx>.

2 IARC (2014). Cancer incidence in five continents, Vol. I–X (electronic version). Lyon, France: IARC. Available from <http://ci5.iarc.fr/ci5I-x/default.aspx>.

3 Sankaranarayanan R, Swaminathan R, Brenner H, Chen K, Chia KS, Chen JG, et al. (2010). Cancer survival in Africa, Asia, and Central America: a population-based study. *Lancet Oncol*.11:165–73.

4 <http://handbooks.iarc.fr/>; <http://monographs.iarc.fr/>

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