Early detection of breast cancer using mammography – a position paper of the Swiss Cancer League

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Summary

In summary the following observations can be made:

Breast cancer is a significant health problem for women in Switzerland.

Compared to advanced stage diagnosis, treatment of breast cancer in an early stage is associated with better survival. Until research reveals effective measures for preventing or curing breast cancer regardless of the stage of diagnosis, early detection will remain essential in reducing the physical and psychological disease burden associated with breast cancer.

Solid scientific evidence exists that systematic invitation of women between ages 50 and 69 to mammography examinations reduces breast cancer mortality. The results of randomized studies of organized mammography programs in several countries show an average reduction of breast cancer mortality by 25% in the target population.

The reductions actually achieved by nationally or regionally implemented mammography programs in target populations vary between 5 and 20% and depend on both the frequency and quality of opportunistic mammography screening as well as the quality of treatment after a breast cancer diagnosis.

Mammography may have adverse consequences such as insecurity, anxiety as well as unnecessary diagnostic workup and treatment. In the context of organized mammography programs the extent of these consequences can be documented and systematically reduced.

The cost-effectiveness ratio achieved in certain countries in the context of organized mammography programs (up to CHF 20,000 per year of life gained) is comparable to other specific public health measures such as cervical carcinoma screening. In Switzerland the cost-effectiveness ratio must be discussed in the light of a probably relatively high rate of opportunistic screening, but the respective data is lacking and will only become available after the implementation of organized mammography screening.

Position of the Swiss Cancer League

Therefore, in support of an informed decision of the women, the Swiss Cancer League has concluded that all women in Switzerland should have the option of a regular access to quality assured mammography as an essential service of the basic Swiss health insurance.

The scientific evidence documents a justifiable cost-effectiveness ratio for organized mammography programs. Organized mammography screening is preferable to opportunistic screening, in particular because no evaluation of quality and impact is possible for the latter.
In the light of the complex structure of the Swiss healthcare system and the cultural differences between the country's language regions, it is unlikely that an organized national mammography program will be set up in the near future.

The existing organized mammography programs in the western parts of Switzerland should carefully be evaluated. Particular consideration must be given to the time trends of the rates of false positives, of unnecessary biopsies and of interval cancer diagnoses as well as a comparison of the diagnostic stage at which breast tumors are detected in organized programs compared to those detected in opportunistic screening. Certainly, a further reduction of the breast cancer mortality in the context of organized programs cannot be the key measure of success in a country with a presumably relatively high rate of opportunistic screening. Expectations and interpretation of the evaluation results should transparently be discussed in due time with the decision-making committees in healthcare policy.

For those regions of Switzerland that are not currently covered by organized mammography screening programs measures should be taken to strengthen quality assurance and evaluation of screening mammography. Ideally, the latter should be defined in a binding manner within the existing system considering the regional-cultural differences. Constructive cooperation of the relevant health care providers must be encouraged for this purpose.

All women in Switzerland should be informed in a comprehensive and balanced manner by the participating institutions (responsible parties in cantonal programs, doctors, health insurance providers, Federal Office for Social Security etc.) regarding the benefits and limits of the screening mammography enabling the women to make their own decisions on mammography use (Empowerment and Informed Choice).
Introduction

Worldwide breast cancer is a significant public health problem and, with about 1,500 deaths annually, it is the most common cause of cancer mortality among women in Switzerland. Until research reveals effective measures for preventing and curing breast cancer regardless of the diagnostic stage, early detection remains an essential method for reducing the associated physical and psychological burden of disease.

Early detection of breast cancer using mammography is one of the few population-based screening measures that have been scientifically examined in depth and detail [1, 2]. The scientific discussion on the efficacy of mammography for early detection of breast cancer [3-6] is now considered closed [1, 2]. Systematic mammography screening of women between ages 50 and 69 is considered to reduce breast cancer mortality.

Since 1997, screening mammography for early detection of breast cancer in women between ages 50 and 69 has been an essential service of the basic Swiss health insurance system under the condition that EU quality control requirements are met [7, 8]. This decision was taken conditionally until 31 December 2007. The evaluations that must be conducted by the end of 2007 will contribute substantially to the decision for or against continuing covering screening mammography. The quality requirements for systematic early detection of breast cancer using mammography require organized programs. These are geared towards

- unrestricted access for the target group,
- high examination quality to ensure effective disease control while reducing, ideally, preventing possible harmful effects of the examination, and
- creating the required conditions for impact assessment.

The introduction and possible implementation of a national mammography screening program in Switzerland encountered significant problems and resistance by various actors [9]. The current situation may be described in the following manner:

In early 2003, organized programs are available in three cantons (Geneva, Vaud and Valais). In three other cantons of the French-speaking part of Switzerland, discussions on a concrete implementation are underway. For women living in other cantons who wish to have access to a mammography for early detection of breast cancer, the mammography is not subject to any systematic or documented quality control system and the health care insurances only cover the costs in part and subject to franchise restrictions.
Definitions

Screening Mammography:

- Mammography screening program or systematic early detection of breast cancer using mammography

  Systematic early detection of breast cancer using mammography means a quality-assured program with systematic periodical invitation of all women in a particular age group (in the target group) to a cost-free mammography examination for the purpose of early detection of breast cancer. Subsequently, the terms "systematic mammography", "mammography screening program" and "organized mammography programs" will be used interchangeably.

- Opportunistic mammography screening

  This means individually chosen access by asymptomatic women to a mammography examination that is not a response to an invitation in the context of a mammography screening program. Therefore, quality assurance aspects (that are part of a mammography screening program) are not uniformly regulated or documented. Comprehensive and free access for all women – regardless of social or economic background – to mammography is not guaranteed.

Diagnostic Mammography

By diagnostic mammography we mean the use of mammography x-ray examinations for determining if a breast tumor is present in a woman having symptoms or a predisposition for breast cancer.

This position paper discusses screening mammography and not diagnostic mammography.

WHO criteria according to Wilson and Jungner for evaluating screening measures

In the 1960s the World Health Organization adopted the criteria for judging public health screening programs set out by Wilson and Jungner [10]. These subsequently updated and adapted criteria are [11]:

1. The condition to be detected is of public health importance.
2. The natural history of the condition is understood and there is an unsuspected but detectable (pre-clinical) stage.
3. There is an ethical, acceptable, safe and effective procedure for detecting the condition at a sufficiently early stage to permit intervention.
4. There are ethical, acceptable, safe and effective preventive measures or treatments for the condition when it is detected at an early stage.

5. There is sufficient political will, and it is feasible to carry out the relevant screening, diagnostic and intervention practices in a population-based manner with existing resources or with resources that could be obtained during the planning period.

6. Adoption and implementation of the screening, diagnostic and intervention practices will strengthen development of the health system and overall societal development in a manner consistent with the principles of primary health care.

7. The cost of the screening and intervention is warranted and reasonable compared with alternative uses of resources.

On the following pages we think to demonstrate that mammography screening meets these criteria and quality-assured programs for optimizing the benefit/risk profile are justified in Switzerland.
Mammography screening: initial situation and available evidence

**Breast cancer: the epidemiological situation**

In Switzerland about 4,000 women are diagnosed with breast cancer every year and about 1,500 die from this disease annually [12, 13]. Breast cancer is the most common cause of cancer mortality among Swiss women [13]. An estimated 15,000 to 18,000 women in Switzerland have had a breast cancer diagnosis in the last 5 years and live with this disease (Source: IARC, Lyon). Therefore, breast cancer is a significant health problem in this country. Comparable breast cancer mortality figures (age standardized mortality per 100,000 women) in Europe show that the temporal trends in the last decades were relatively stable in most countries up to 1990. In some countries, such as the Netherlands and the United Kingdom, the mortality figure has exhibited a downward trend since 1990 [14, 15]. Likewise, after 1990 a decline in the breast cancer mortality rate is recognizable in the USA [16, 17]. Indications of a decline in breast cancer mortality are also accumulating in Switzerland [14]. To what extent the reductions of breast cancer mortality in various countries are due to mammography screening, improvements in treatment or perhaps even changes in coding causes of mortality is a matter of ongoing research [17].

**Breast cancer: options for early detection**

Systematic mammography for early detection of breast cancer has been investigated scientifically for over 30 years. Large population-based and randomized studies on the efficacy of screening mammography have been conducted in several countries [1, 2], most notably the USA, Canada, Sweden and the United Kingdom. In these and other countries, starting from pilot programs in pilot regions, regional and national mammography programs have been established since the 1970s and have continuously been evaluated [18-22].

Screening mammography has clearly documented limits of sensitivity and specificity [2]. Therefore, the search for more reliable technologies and methods for the early detection of breast cancer is the subject of intensive research efforts but so far no alternative method has been sufficiently well evaluated to justify at this time a systematic population-based application [23].

Breast self-examination is recommended to women for early detection of breast cancer. Whether systematic breast self-examination instructions reduce breast cancer mortality was explored in several studies, but these studies did not provide the expected evidence of efficacy [1, 24-27]. However, breast self-examination is believed to contribute importantly to increased body self-awareness and early detection of unusual modifications in the breasts.
Mammography screening: the scientific evidence

Efficacy

In various countries large population-based and randomized studies on the efficacy of systematic invitation to screening mammography have been conducted. Up to the late 1990s the results of these studies on the efficacy of mammography programs in reducing breast cancer mortality were judged to provide evidence for a 20 to 30% reduction of breast cancer mortality [28]. In these studies women who were systematically invited to screening mammography were compared to women who were not systematically invited. After the publications in the Lancet in 2000 and 2001 [3, 6], the discussion on the efficacy of mammography screening resumed in Switzerland [4, 5, 29] and many other countries. Additionally it was asked whether population-based early detection of cancer should prove its efficacy by a reduction in total mortality or by a reduction in cancer-specific mortality [6, 30, 31]. Since the publication of two large systematic reviews on the efficacy, the range of side effects and cost-effectiveness of systematic mammography screening the discussion on mammography efficacy may be considered as resolved [1, 2, 32-34]. Based on these two reviews compiled by expert groups from America and Europe one can summarize the situation in the following manner:

Sufficient solid evidence has accumulated from randomized studies to conclude that systematic and regular invitation of women of ages 50 to 69 to mammography examinations reduces breast cancer mortality. The best estimate of the magnitude of the reduction achieved in randomized studies is 25% when comparing invited intervention groups with ones that were not invited [32, 35].

Effectiveness

Evidence is accumulating from several countries that organized mammography programs (implemented outside of randomized studies) can reduce the breast cancer mortality in the target group. The experience in European countries suggests that, in the long-term, a reduction of about 20 % can be achieved in the target population under real conditions, but achieved reductions may vary substantially from country to country resulting in a range of effectiveness estimates of 5 to 20 % [33, 35].

Mammography screening: applicability of the available evidence to the Swiss situation

The life-lengthening and lifesaving effect that a method of early detection of cancer aims for is always closely linked to the therapeutic options and interventions following a cancer diagnosis, and treatment options have substantially changed and expanded over the last 20 years both for breast and other cancers. This expansion of therapeutic approaches over time constitutes a fundamental problem in applying and generalizing study results of the 1980s to the early 21st century, even if, at the time they were conducted, the studies satisfied the most up-to-date methodological requirements.
Of course, the maximum reduction of breast cancer mortality achievable with a mammography screening program in a particular population depends on the frequency and quality of the opportunistic mammography screening performed before and parallel to program implementation. Reliable data on the frequency and quality of opportunistic mammography screening in Switzerland since 1997 appears not to be available (personal communication, Dr. Gurtner, Federal Office for Social Security). However, based on information collected in the Swiss Health Survey, it may be assumed that opportunistic mammography examinations are performed quite frequently.

Based on these aspects, when judging the regional mammography screening programs in the French-speaking parts of Switzerland a strong emphasis should be put on comparing the profile of side effects of opportunistic versus organized mammography screening rather than expecting a striking reduction of breast cancer mortality. The evaluation of these regional quality-assured mammography screening programs is critical in providing more reliable data on the access to and quality of screening mammography in Switzerland.

**Mammography screening: side effects and costs**

In the situation of a high acceptance rate and an optimal quality control system we might expect that systematic mammography for breast cancer will reduce breast cancer by 20% in the target population after an introductory phase of about 7 to 10 years. But even under these ideal conditions the possible adverse effects caused by this population-based measure are of concern, for example with respect to additional diagnostic workup due to false positive results as well as psychological and social side effects on women who do or do not want to participate in the program [1, 2, 36-38]. However, these aspects of adverse effects can only be documented and evaluated in the context of quality assured mammography screening programs.

Additionally, questions need to be answered regarding efficient resource use in comparison with other population-based measures in primary and secondary prevention [39, 40]. The estimated costs per year of life gained depend on the incidence of the disease, the quality of the screening program, the participation rate achieved, the form and cost structure of the healthcare system [34, 40]. If cost estimates for Germany are applicable to Switzerland, then CHF 15,000 to 20,000 per year of life gained need to be expected for long-term mammography screening programs [40, 41]. For the USA the costs are somewhat higher with estimates of USD 19,000 to 35,000 per quality-corrected year of life gained. This is plausible given that annual mammography screening is recommended [39]. Even if the absolute cost estimates are not applicable to Switzerland, this US study contains useful information on the comparison with other population-based healthcare measures: colon cancer screening appeared to be more cost-efficient than mammography screening (Graph 3 of [39]) but costs per quality-corrected year of life gained in mammography screening were in the same order of magnitude as for cervical carcinoma screening. For Switzerland however, the cost data on opportunistic
mammography screening, which is at least in part paid by the health insurance companies, is lacking. Therefore Swiss specific cost estimations describing the status quo in Switzerland can not be performed.

Organized mammography programs in Europe and Switzerland

Organized mammography programs in Europe

In the years 1987 to 2002 national or regional mammography screening programs were implemented in several European countries, and the majority of these were directed at the 50 to 69 year age group and a 2-year screening interval was usually selected [18]. Organized mammography screening programs exist in almost all European countries, but achieved coverage of the target population varied between <25 to 100% (Table 10 in [18]).

Most of these programs cooperate in the European Breast Cancer Network (EBCN), which also includes EUREF, the European Network of Reference Centers (European Reference Organisation for Quality Assured Breast Screening and Diagnostic Services). This organization has developed quality assurance guidelines for screening programs [7, 8] and has continuing education facilities for program directors and radiologists who evaluate screening mammographies, and accredited continued education sites are located in Sweden, Holland, England, Italy and France.

The EUREF quality assurance recommendations contain requirements for the implementation of the screening program, physical and technical requirements for mammography examinations and guidelines regarding cytopathology and histopathology. Additionally, definitions exists on the frequency (daily, weekly and annual) of certain quality tests that need to be performed.

Organized mammography programs in Switzerland

In October 1993 in the regions Aigle, Morges and Aubonne of the canton of Vaud a pilot program for breast cancer screening using mammography was started. The pilot phase was initially defined to last for 4 years and was eventually extended to March 1999.

In 1997 mammography for early detection of breast cancer in women between ages 50 and 69 became an essential service of the basic Swiss health insurance system under the condition that EU quality requirements are met. This decision was taken conditionally until 31 December 2007. The evaluations that must be conducted by the end of 2007 will contribute substantially to the decision for or against continuing covering screening mammography.

On 23 July 1999, the Federal Council passed a regulation regarding quality assurance in programs for the early detection of breast cancer using mammography. The content of the regulation is largely based on European guidelines for quality assurance in organized screening programs, and demands that each screening programs should cover at least the population of an entire canton.
In 1999 the Vaud pilot program was extended to the entire canton. About 11,000 women were potentially covered in the pilot program, and about 75,000 in the program extended to the entire canton of Vaud. In March of 1999 implementation of a screening program was started in the canton of Geneva. The program in Valais followed in the summer of 1999.

In March of 2000 the launch of a national mammography screening program was stopped by the Foundation for the Early Detection of Cancer. The main reason for this was the fact that no solution was found for closing the financing gap that had opened between the anticipated costs according to the service providers and the compensation offered by the health insurance companies. The Swiss Conference of Cantonal Ministers of Public Health decided against covering this financing gap.

Currently (in 2003), specific plans for implementing additional mammography screening programs are only discussed in the French-speaking parts of Switzerland: the Dispositif intercantonal pour la prévention et la promotion de la santé (DIPPS) developed a feasibility study for establishing comprehensive, organized mammography screening throughout French-speaking Switzerland.
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