

Persistent Untreated Screening-Detected Breast Cancer: An Argument Against Delaying Screening or Increasing the Interval Between Screenings

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Abstract

Purpose: The aim of this study was to investigate the natural history of untreated screen-detected breast cancer.

Methods: A prospective cohort survey of Society of Breast Imaging fellows concerning the appearance on subsequent mammography of untreated breast cancer detected on screening mammography was conducted.

Results: A representative sample of the 108 actively practicing Society of Breast Imaging fellows ($n = 42$ [39%]) participated, each reporting outcomes data from his or her entire screening mammography practice. Among all practices, 25,281 screen-detected invasive breast cancers and 9,360 cases of screen-detected ductal carcinoma in situ were reported over the past 10 years. Among these cancers, there were 240 cases of untreated invasive breast cancer and 239 cases of untreated ductal carcinoma in situ, among which zero were reported to have spontaneously disappeared or regressed at next mammography.

Conclusions: Among 479 untreated breast cancers detected on screening mammography, none spontaneously disappeared or regressed. An unknown percentage of these cancers represent overdiagnosis, but because all untreated screen-detected cancers were visible and suspicious for malignancy at next mammographic examination, delaying the onset of screening or increasing the interval between screenings should not reduce the frequency of overdiagnosis.

Key Words: Screening mammography, breast cancer natural history, screen-detected breast cancer, overdiagnosis, Society of Breast Imaging, SBI

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INTRODUCTION

Screening mammography is one of many screening tests available to 21st-century women. The National Institutes of Health defines screening tests as ones “that

look for diseases before you have symptoms. Screening tests can find diseases early, when they’re easier to treat” [1]. Screening mammography accords with this definition by finding breast cancer earlier, when it is easier to treat and has a better prognosis. For example, in a study by Buseman et al [2], women with breast carcinoma who underwent regular screening mammography were found to have more favorable cancer stages at diagnosis than those who did not undergo regular screening. Furthermore, earlier breast cancer stage at diagnosis correlates with reduced breast cancer mortality [3]. Finally, the several randomized clinical trials involving screening mammography, in combination, demonstrate a statistically significant reduction in breast cancer mortality associated with the invitation to be screened [4]. Thus, the

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effectiveness of screening mammography is based on its ability to permit the detection of breast cancer earlier and at a smaller size, interrupting the natural history of the disease. Screening mammography has been extremely successful in achieving this goal: since its widespread introduction into the US population in the mid-1980s, the death rate from breast cancer, previously unchanged for decades, has decreased by 37%, largely attributable to screening [5-7].

Despite the benefit of decreased breast cancer-specific mortality associated with screening mammography, aggressive attempts to limit screening have been made by some who value the reported “harms” of screening more than the proven mortality benefit [8-11]. Recently, the most widely publicized of these harms is overdiagnosis, defined as diagnosis of a disease (in this case, breast cancer) by screening that never would have become symptomatic in the patient’s lifetime or diagnosis of a disease that does not cause the death of the patient. However, overdiagnosis cannot be measured directly, leading to considerable uncertainty about how frequently it occurs and to lack of consensus in how to estimate the magnitude of overdiagnosis [12-15]. Some national organizations recommend limiting screening (onset at age 50 instead of 40, biennial instead of annual) by placing great value on the harm of overdiagnosis. But limiting screening by delaying the age at which it begins and/or by increasing the interval between examinations should not reduce the frequency of overdiagnosis because if a woman has mammographically discernible breast cancer, this cancer should be identified on screening mammography at time 0 (annual screening starting at age 40), 1 year later (biennial screening), or 10 years later (starting screening at age 50 instead of 40), either at the same size (if indolent) or larger (if tumor growth is more rapid). The reason for this is that, in our experience, untreated breast cancer does not spontaneously disappear or regress, so those screening-detected cancers that involve overdiagnosis will be detected, diagnosed, and treated whenever the next screening examination is done. However, the motivation for the present investigation was to go beyond our anecdotal experience and collect robust observational data from a larger group of breast imaging experts about the natural history (mammographic appearance) of screen-detected breast cancer.

In this study we surveyed the fellows of the Society of Breast Imaging (SBI) regarding untreated, screen-detected, biopsy-proven breast cancers and their

associated natural histories. Breast imagers interpret very large numbers of screening mammograms, as well as subsequent diagnostic evaluations during the surveillance period after a screen-detected cancer diagnosis is made. Therefore, breast imagers are uniquely situated to observe the natural history of the mammographic appearance of screen-detected breast cancers if any go untreated, which may occur for a variety of reasons, including patient contraindications to surgery, chemotherapy, hormonal therapy, radiation, and/or individual preference; some patients with screen-detected biopsy-proven breast cancer are not treated. These patients provide the opportunity to assess how frequently the mammographic features of breast cancer spontaneously disappear or regress.

METHODS

This was a prospective cohort study using an online survey instrument. The cohort was composed of SBI fellows, the rationale being that SBI fellows, by definition of their criteria for selection, are experienced breast imagers [16]:

A Fellow shall...exhibit demonstrated excellence in the discipline of breast imaging by having (i) authored publications on clinical or research aspects of breast imaging, (ii) been recognized as a teacher in the area of breast imaging, and/or (iii) been recognized for clinical expertise in breast imaging at the regional or national level.

As no review of individual patient records constituted any part of this study, institutional board approval was not applicable.

The survey was hosted at [SurveyMonkey.com](https://www.surveymonkey.com), a web-based survey provider, and was composed of 14 questions ([Appendix 1](#)) written by the study investigators. In December 2016, an e-mail invitation to participate in the voluntary survey was sent to all SBI fellows listed in the SBI directory. Survey instructions requested that if there was more than one SBI fellow in each breast imaging practice, these SBI fellows should complete the survey together to avoid duplication of data. Respondents were asked to complete the survey questions on the basis of their practice’s audit information, if accessible; if not, they were asked to complete the survey questions on the basis of their best estimates. In brief, the survey asked questions about the number of screening mammograms interpreted in each practice in the past year and 10 years, the number of screen-detected breast cancers in the past year and 10

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