



To the Editors:

The recent article by Bleyer and Welch (1) used SEER data to define early and late stage breast cancer rates, and in turn to evaluate the efficacy of screening mammography. Rates were calculated from a pre-mammography cohort, defined by the authors as 1976-1978, and a post-screening cohort, defined by the authors as 2006-2008, and the rates during the two periods of time were then compared. They define the rate of overdiagnosis as the difference (the increase) in early stage disease between the two periods. Their hypothesis is that a marked increase in early stage disease should be accompanied by a marked decrease in late stage disease. They conclude that screening mammography substantially increases the rate of early stage breast cancer, but has only marginally reduced late stage malignancy, and that mammography has only a small effect on decreasing death from breast cancer. They calculated an overdiagnosis rate ranging from 22-31% and suggest that advances in therapy are the main reason for the observed decrease in breast cancer deaths.

The authors used a very narrow three year period from 1976-1978 to estimate the rate of change in breast cancer incidence prior to the onset of screening. They calculated that, in the absence of screening, the incidence should have increased by 0.25% per year. It is unclear why they ignored forty years of data showing that the actual rate of increase for invasive cancer had been a steady 1.0% per year [2]. Had they looked at invasive cancers alone, and used a valid baseline for invasive cancers that increased by 1% per year from 1980 to 2008, they would have found 100/100,000 cases of invasive cancer in 1980, and would have predicted at least 132/100,000 by 2008. The authors also ignored lead time and prevalence screening of new women entering the screening pool, which should have kept invasive cancers well above 132/100,000. Actual SEER data for 2008 show 128/100,000 cases of invasive

cancer. This means that there were *fewer* invasive cancers in 2008 than would have been predicted had the incidence continued to increase at the expected rate of 1% per year from 1980-2008. Had they evaluated DCIS separately, and used a data-proven increase of 1% per year for invasive cancers, they would find that their claims of overdiagnosis are greatly exaggerated.

Why did the authors combine the data for ductal carcinoma in situ (DCIS) with early invasive cancers? There is no scientific reason to do this other than to dilute the importance of finding small invasive cancers, a benefit of mammography. This is a critical issue, since it is the detection of early invasive cancers that results in fewer deaths due to screening. Combining DCIS with invasive cancers in this analysis has only the effect of obscuring one of the main benefits of mammography. It has been known for decades that DCIS is primarily found by screening and also that some DCIS may progress slowly. However, we have yet to determine the best approach to managing these lesions.

The authors' definition of early and late stage disease is also problematic. The authors define late stage disease as malignancy outside of or adjacent to the organ of disease. The remainder is "early" stage disease. This definition, since it does not take into account tumor size as does the AJCC classification, potentially places clinically detected disease into the "early" stage of disease. For example a stage IIB breast cancer, with a tumor size greater than 5 cm, but with no nodal involvement, would be placed into early stage disease as defined by the authors. This would falsely increase early stage disease and underestimate late stage disease.

In addition, authors state two prerequisites for a screening test. First, screening must advance the time of diagnosis of cancers *that are destined to cause death*, and second, early treatment of these cancers must confer some advantage over treatment at *clinical* presentation. The goal of screening mammography is to detect breast cancer before it presents clinically, and combined with treatment, has resulted in significant mortality reduction. We believe that screening mammography clearly meets the criteria described by the authors.

Finally, mammography use was not measured in any of the SEER data used by the authors. The title of the article suggests that mammography is being assessed but it is not known from this data who did or did not have mammography, with what frequency women were screened, nor which tumors were and

which were not detected by mammography.

Physicians (and ultimately the public) rely on medical journals to present solid, evidence-based results. To do otherwise jeopardizes our integrity and the health of our patients. Allowing authors to draw conclusions about the effectiveness of mammography using incorrect assumptions and without direct data on how and when mammography was actually utilized amounts to little more than guessing.

A large body of scientific knowledge on screening mammography has been gained through rigorous outcomes research on millions of women. Eight prospective randomized trials and multiple large population based reports have consistently shown the same result – a statistically significant reduction in mortality from breast cancer of 25-30% with the use of screening mammography. The benefit is even greater among women who actually participated in screening compared with the group of women who were invited to screening.

A reasonable discussion and even debate of both the benefits and risks of mammography is welcome, but using "estimates" and "assumptions" in place of direct data to arrive at highly debatable conclusions that can have serious implications for tens of millions of women is suboptimal. Conducting valid scientific evaluations is a task of enormous importance. Regarding an issue where so many lives are at stake, quality of life for many women so greatly affected, and confusion is so rampant, the analysis should be based on real data, not theoretical models based on poor assumptions and statistical manipulations.

We recommend that clinicians view the results of this study with extreme reserve.

References:

1. Bleyer A, Welch HG. Effect of three decades of screening mammography on breast-cancer incidence. *N Engl J Med* 2012; 367: 1998-2005
2. Garfinkel L, Boring CC, Heath CW Jr. Changing trends. An overview of breast cancer incidence and mortality. *Cancer*. 1994 Jul 1;74(1 Suppl):222-7

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