

## CA

## The Breast Cancer Detection Demonstration Project 25 Years Later

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It is now almost exactly 25 years since the American Cancer Society first conceived and then proposed to the National Cancer Institute a collaborative effort to demonstrate the feasibility of large-scale screening for breast cancer.<sup>1</sup> The Breast Cancer Detection Demonstration Project (BCDDP) was inspired by early reports of favorable results from the Health Insurance Program of Greater New York (HIP) study. A total of 280,000 volunteer women aged 35 to 74 years were recruited to 29 locations and screened annually for 5 years with two-view mammography, clinical breast examination, and, in the early years, thermography (discontinued in 1977). Although this was not conceived specifically as a research project, a number of questions were explicitly proposed, including the possible effectiveness of applying research-based screening to a general population, whether or not identification of non-palpable breast cancer would save lives otherwise lost to breast cancer, and whether groups of women at high risk for developing breast cancer could be defined.<sup>1,2</sup>

In this issue of *CA*, Smart and colleagues<sup>3</sup> report on the 20-year follow-up of breast cancer diagnosed in the BCD- DP. To appreciate the significance of this report, one needs to appreciate a little of the history of the BCDDP.

Almost from the beginning the BCDDP was challenged on issues of risk, cost, effectiveness, and purpose.<sup>1</sup> Though

screening for women less than 50 years of age had (rather anomalistically) been alleged not to be effective in the HIP trial, a serious burden of breast cancer in younger women was apparent even then and was made more poignant, perhaps, by the well-publicized breast cancer experiences of both Happy Rockefeller and Betty Ford. Thus, it was inevitable that large numbers of women younger than 50 years would enthusiastically enroll for screening, amounting, in fact, to approximately half of all women enrolled in the project. (It was also inevitable that subsequent reviewers would valiantly search the BCDDP database for evidence of effectiveness of screening in this age group, measured by lowered mortality from breast cancer, a challenge the BCDDP was never intended to, and really could not, resolve.) Lastly, it was in the early enrollment years of the study that serious concerns regarding radiation risk from mammography first surfaced and, to some extent, had an adverse impact on subsequent compliance with the screening protocol.<sup>1</sup>

Buffeted by so many political and scientific cross-currents, the BCDDP carried an enormous burden of expectation and scrutiny. What, then, 25 years later, have been the results?

A few the observations made by Smart and colleagues deserve special mention:

“Mammography was very effective in identifying most cancers in all age groups but was more sensitive in older women. Mammograms “missed” 10% of cancers in women younger than 50 years

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but only 5% in women older than 50 years.

“Prognostic factors (tumor size, lymph node status, and stage) were remarkably similar for all decades of age grouping, suggesting that cancer detected by screening is little different for younger as compared with older women. However, the mean time from diagnosis to death was shorter for younger than for older women, hinting that cancer in younger women may be more rapidly growing, regardless of stage.

“Mammography was clearly able to detect nonpalpable breast cancer, both invasive and noninvasive.

“The overall breast cancer specific survival for the cohort was much greater than would be expected when compared with survival in a Surveillance Epidemiology and End Results (SEER) population (expressed as “relative survival”). Therefore, because tumor characteristics and survival were similar across all age groups, the implication is that screening in the BCDDP population not only conferred a survival advantage but did so equally for younger and older women.”

The real contributions made by the BCDDP, however, go well beyond the Socratic arguments for or against mortality reduction (which the BCDDP was never intended to directly address). Together with HIP, the BCDDP was undoubtedly the stimulus for development of the subsequent randomized clinical trials conducted in Canada and Europe; that is, the

BCDDP significantly advanced both the notion and the science of population-based breast cancer screening.<sup>4</sup>

Further, the BCDDP provided a huge database for epidemiologic research focusing on questions such as the relationship of mammographic features, hormone use, obesity, body mass, and benign breast disease to the risk of developing breast cancer.<sup>1,5-10</sup> It has investigated the relationship of risk factors to the development of interval breast cancers,<sup>11</sup> the detection rate and tumor characteristics of different ethnic groups, and the epidemiology of minimal breast cancer.<sup>1,12-14</sup>

The BCDDP allowed the development of the Gail model of breast cancer risk assessment, itself the basis for identifying and recruiting high-risk women to the P-I tamoxifen prevention trial.<sup>15</sup>

Lastly, it stimulated relentless and effective efforts to reduce radiation exposure and improve image quality and overall standards of mammography performance.

In summary, it is safe to say that the BCDDP more than fulfilled its mission as well as the hopes and aspirations of its founders. In view of what we have now learned regarding the timing and benefit of mammographic screening on breast cancer mortality in countries where breast screening has been widely adopted, it is not too much to say that the BCDDP may ultimately be judged to be one of the epochal detection trials of the last half century.

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