The Meaning of “Adjusted” and “Observed” Survival Rates

To the Editor:
“Twenty-Year Follow-up of the Breast Cancers Diagnosed During the Breast Cancer Detection Demonstration Project” in the May/June 1997 issue1 was an excellent paper. In Table 5 the authors present the adjusted and observed survival rates of patients with breast cancer. As a clinician, I would find it helpful to have an explanation of the terms “adjusted survival” and “observed survival.”

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Reference
1. Smart CR, Byrne C, Smith RA, et al: Twenty-year follow-up of the breast cancers diagnosed during the breast cancer detection demonstration project. CA Cancer J Clin 1997;47:134-149.

Authors’ Reply:
Dr. Lawrence’s question about the definitions of “adjusted survival” and “observed survival” is important.

As mentioned in the “Methods” section of the article, we considered various measures of survival in our analysis of the Breast Cancer Detection Demonstration Project (BCDDP). Adjusted survival appeared to be the most appropriate measurement of outcome for this study. In this analysis, information on the cause of death was taken from the death certificate, and “adjusted survival” counted only deaths from breast cancer as “events.” Breast cancer was considered the cause of death whether it was a primary or a contributing cause.

Thus, in the survival analysis, women who had breast cancer but died of other causes contributed to follow-up until the time of death, but their deaths were not counted as events. Evaluating only breast cancer death as the outcome provided a way for us to “adjust” for other causes of death in this analysis.

In contrast, the observed survival presented in Table 5 counts any death regardless of cause as an event.

Because one goal of our analysis was to make comparisons among women diagnosed with breast cancer at different ages, comparing observed survival by age is problematic because death rates from all causes increase as women get older. However, since some argue that the cause of death is less important than whether the patient is alive or dead, we presented the observed survival for comparison.

We also wanted the analysis to consider the question “to what extent did the diagnosis of breast cancer affect the survival of women participating in the BCDDP?” To answer this question we would need to know the expected survival rates for these women if they had not been diagnosed with breast cancer. As a substitute for this information, studies such as ours often use death rates from a national population. These rates would be the basis for estimating relative survival, or the ratio of the observed survival rate to the expected survival rate for the cohort.

The women who volunteered for the BCDDP were not a representative sample of the US population, however, and other analyses have shown that their age-specific death rate for all causes is much lower than national rates.1 As described in the “Methods” section, the adjusted breast cancer survival and the relative survival from the population-based Surveillance, Epidemiology and End Results (SEER) program are quite similar (57% and 53%, respectively). Because we did not have appropriate external death rates to apply to the BCDDP population to use in the calculation of relative survival, adjusted breast cancer survival rates provided the closest measure to address this...
To the Editor:
In the article “Evaluation of Common Breast Problems: Guidance for Primary Care Providers” in the January/February issue, Cady et al1 present an excellent overview for primary care providers of these issues. They note that although 75% of women with breast cancer have no clear risk factors, clinical evaluation should identify risk factors including age, first-degree relatives with breast cancer, age at first pregnancy, early menarche or late age at menopause (or both), and a history of radiation to the breast area in childhood. The authors do not mention active and passive smoking as risk factors for breast cancer in women.

A plausible basis for the hypothesis that inhalation of tobacco smoke is related to the development of breast cancer in women is that breast tissue and nipple secretions of women smokers are bathed in mutagenic tobacco chemicals.2 Genetic polymorphisms, which may be found in 50% of white females in the United States, predispose postmenopausal white women who have the N-acetyltransferase 2 slow acetylation genotype to breast cancer. Smoking at an early age was a predictor of breast cancer in these women.3

Active and passive smoking are important risk factors for breast cancer. Among 880 cases of fatal breast cancer, smoking was related to fatal breast cancer risk (adjusted rate ratio [RR] = 1.26). A dose-response relationship was found, with increased fatal breast cancer risk related to increased number of cigarettes smoked. Consumption of 40 or more cigarettes a day was associated with an RR of 1.84.4

In a study of 3,240 women aged 15 to 92 years referred for mammography, multiple logistic regression analysis showed an increased risk of breast cancer in women who had smoked for 30 years or more (odds ratio 1.6, 95% confidence interval 1.1 to 2.3).5

In a case-control study of 1,276 women, the adjusted odds ratio (OR) of breast cancer for ever-active smokers compared with women not exposed to passive or active smoke was 2.2 for those who smoked 1 to 9 cigarettes a day, 2.7 for those who smoked 10 to 19 cigarettes a day, and 4.6 for those who smoked 30 or more cigarettes a day. In passive smokers, the adjusted OR was 3.2 (95% confidence interval 1.6 to 6.3) for exposure 2 hours a day for 25 years. Among 835 women with primary malignant unilateral breast cancer, the risk of developing lung metastases was increased by 3% to 7% (P < 0.001) for every 1,000 packs of cigarettes consumed over a lifetime.7

In view of this accumulating body of research, guidelines for primary care clinicians regarding the evaluation and management of breast cancer should include active and passive smoking as risk factors for breast cancer in women. Most risk factors for breast cancer cannot be controlled by the patient, but women who are advised about the risks of inhaling tobacco smoke can take specific steps to reduce or eliminate their risk. Current state-of-the-art smoking-cessation programs are accessible to most women and are cost-effective preventive health activities.8